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# TRANSACTIONS

OF THE

# ROYAL ACADEMY OF MEDICINE IN IRELAND.

# TRANSACTIONS

OF THE

# Royal Academy of Medicine

## IN IRELAND.

## VOL. XXIV.

EDITED BY
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1887 FRASER, ALEC, M.B., F.R.C.S., Professor of Anatomy Royal College of Surgeons, Ireland, 18 Northbrook-road, Leeson-park. [1]

1891 GLENN, JOHN HUGH ROBERT, M.D., F.R.C.P., Gynæcologist Mercer's Hospital, 24 Lower Baggot-street, Dublin.

1898 GOLDIE, GEORGE J., L.R.C.P. & S. Edin., L.F.P. & S. Glasgow, L.D.S Edin., 95 Merrion-square.

1893 GORDON, THOMAS EAGLESON, M.B., F.R.C.S., Surgeon Adelaide Hospital, 8 Fitzwilliam-square, Dublin. [2]

1905 GREEN, J. S., Major, R.A.M.C., Temporary Fellow, 83 Lower Leeson-street.

1902 GUNN, L. G., M.D., Dub., F.R.C.S.I., Assistant Surgeon Adelaide Hospital, 43 Fitzwilliam-square. [2]

1892 HAMILTON, WM. COPE, L.R.C.P. & S., late Resident Surgeon Steevens' Hospital, 120 St. Stephen's-green, W., Dublin.

1899 HAUGHTON, W. S., M.D., Surgeon to Steevens' Hospital, 30 Lower Fitzwilliam-street. [1]

1905 HAYES, JAMES, L.R.C.P. & S.I., Anæsthetist Mater Misericordiæ Hospital, Marieville, Appian Way, Dublin.

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† HORNE, ANDREW JOHN, F.R.C.P., Master National Lying-in Hospital, 94 Merrion-square, W., Dublin.

1905 HORT, EDWARD C., L.S.A., L.R.C.P.I., Consulting Physician Cosmopolitan Hospital, Venice, San Remo, Italy.

1905 HUDSON, A. AINSLIE, M.D., F.R.C.S. Ed., Resident Physician St. Ann's Hill Hydropathic, Co. Cork. [1]

1883 JACOB, DAVID BALDWIN, M.D., F.R.C.S., Surgeon Queen's County Infirmary, Visiting Physician Maryborough District Lunatic Asylum, Surgeon Queen's County Prison, Port Leix, Maryborough, Queen's Co.

1890 JELLETT, HENRY, M.D., F.R.C.P.I., Gynæcologist Steevens' Hospital, 61 Lower Mount-street.

1885 JENINGS, ULICK A., M.D., Brigade Surgeon, M.S., Retired, Military Prison, Rockspring House, Cork.

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1893 JOYNT, RICHARD LANE, M.D. Univ. Dub., F.R.C.S., Surgeon Meath Hospital, 84 Harcourt-street, Dublin.

1905 KEEGAN, JOHN LEO, F.R.C.S.I., Surgeon Jervis-street Hospital, 2 Pembroke-road.

1899 KENNEDY DENIS, F.R.C.S., Surgeon Jervis-street Hospital and Children's Hospital, Temple-street, 20 Harcourt-street. [1]

1884 KIDD, FRED. W., M.D., Professor of Midwifery, R.C.S.I., ex-Master Coombe Hospital, Gynæcologist Meath Hospital, 17 Lower Fitzwilliam-street, Dublin.

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1899 KIRKPATRICK, T. PERCY C., M.D., Dub., F.R.C.P.I., Physician to Steevens' Hospital, 23 Lower Baggot-street.

1901 LAW, S. HORACE, M.D., F.R.C.S., Throat Surgeon Adelaide Hospital, Surgeon Dublin Throat and Ear Hospital, 49 Merrion-square.

1884 LEDWICH, EDWARD L'E., L.R.C.P. & S.I., Physician to Mercer's Hospital, 30 Upper Fitzwilliam-street, Dublin.

1900 LEEPER, RICHARD R., F.R.C.S., St. Patrick's Hospital, Dublin.

1891 LENNON, EDWARD EMMANUEL, F.R.C.P., Physician Meath Hospital, 22 Merrion-square, Dublin.

† LENTAIGNE, JOHN, F.R.C.S., Surgeon Mater Misericordiæ Hospital, 42 Merrion-street, Dublin.

1897 LETTERS, PATRICK, M.D., Valentia Island.

1898 LINDSAY, JAMES A., M.D., F.R.C.P. London, Professor of Practice of Medicine Q.C.B., Physician Royal Victoria Hospital, Belfast, 13 College-square, E., Belfast.

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1897 LUMSDEN, JOHN, M.D., Physician to Mercer's Hospital, 4 Fitzwilliam-place.

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† M'ARDLE, JOHN STEPHEN, F.R.C.S., Surgeon St. Vincent's Hospital and the Mullen Convalescent Home, 72 Merrion-square, Dublin.

1887 M'CAUSLAND, RICHARD BOLTON, F.R.C.S., Surgeon Steevens' Hospital, 79 Merrion-square, Dublin.

1904 M'GRATH, JAMES JOSEPH, L.R.C.P., St. Helens, Dunfanaghy, Co. Donegal.

1895 M'HUGH, MICHAEL, M.A., M.D., Univ. Dub., L.R.C.S., Professor of Materia Medica R.C.S., Physician St. Vincent's Hospital, 25 Harcourt-street, Dublin.

1902 M'KISACK, H. L., M.D., Physician Royal Victoria Hospital, 17 University square, Belfast.

1905 M'LOUGHLIN, E. P., M.D., R.U.I., Professor of Anatomy Catholic University Medical School, Cecilia-street, Dublin.

1903 MCVITTIE, R. B., M.D., 62 Fitzwilliam-square.

1897 MCWEENEY, E. J., M.D., F.R.C.P.I., Pathologist Mater Misericordiæ Hospital, 84 St. Stephen's-green, Dublin. [2]

1901 MAGENNIS, E., M.D., 37 Harcourt-street.

1900 MAGUIRE, KATHARINE M. N., M.D., 67 Merrion-square, South.

1883 MARQUES, L. PEREIRA, M.R.C.P., L.R.C.S., late Medical Officer Victoria Gaol Hospital, Macao, China.

1896 MARTLEY, FRANCIS C., M.A., M.D., Camb., F.R.C.P.I., M.R.C.S. Eng. and L.R.C.P. Lon., late House Physician St. Mary's Hospital, 71 Lower Baggot-street, Dublin.

1904 MATSON, JOHN A., F.R.C.P.I., Assist. Phys. Richmond, Whitworth, and Hardwicke Hospitals, 16 North Great George's-street. [1]

1897 MAUNSELL, R. CHARLES B., M.B., B.Ch., B.A.O., Dub., F.R.C.S.I., Surgeon to Mercer's Hospital, 32 Lower Baggot-street. [2]

1902 MELDON, G. PUGIN, M.D., F.R.C.S., Surgeon Westmoreland Lock Hospital, 69 Lower Baggot-street.

1904 MILLS, JOHN, M.B., B.S., R.U.I., District Asylum, Ballinasloe.

1901 MITCHELL, A. B., F.R.C.S., Surgeon Royal Victoria Hospital, 4 College-square, Belfast. [1]

1894 MONTGOMERY, ROBERT JOHN, M.A., M.B. Univ. Dub., F.R.C.S., Ophthalmic Surgeon Drumcondra Hospital, Assistant Surgeon Royal Victoria Eye and Ear Hospital, 28 Upper Fitzwilliam-street Dublin.

1897 MOONEY, H. C., M.B., F.R.C.S., Ophthalmic Surgeon Children's Hospital, Temple-street; Assistant Surgeon Royal Victoria Eye and Ear Hospital, 22 Lower Baggot-street.

1894 MOORE, HENRY, L.R.C.P. & S., Surgeon Royal City of Dublin Hospital, 40 Lower Baggot-street.

† MOORE, SIR JOHN WILLIAM, M.D., D.Sc. Oxon., ex-President R.C.P., Physician Meath Hospital, Professor of Practice of Medicine Royal College of Surgeons, 40 Fitzwilliam-square, West, Dublin. [1]

1901 MOORHEAD, GEORGE, F.R.C.S., Tullamore.

1904 MOORHEAD, T. GILLMAN, M.D., M.R.C.P., Physician City of Dublin Hospital, 12 Lower Fitzwilliam-street. [2]

1883 MURPHY, JOHN, F.R.C.P., Physician Mater Misericordiæ Hospital, 13 Merrion-square, Dublin.

† MURPHY, JOHN JOSEPH, L.R.C.P. Ed., 18 Harcourt-street, Dublin.

1904 MURPHY, W. L., B.A., Cantab., L.R.C.P. & S.I., Mater Misericordiæ Hospital.

1886 MYLES, SIR T., ex-President R.C.S., Surgeon Richmond Hospital, 33 Merrion-square, Dublin.

† NIXON, SIR CHRISTOPHER, M.D., ex-President R.C.P., Physician to Mater Misericordiæ Hospital, 2 Merrion-square, N., Dublin.

1889 NOLAN, MICHAEL JAMES, L.R.C.P., L.R.C.S., Resident Medical Superintendent Down District Lunatic Asylum, Downpatrick.

1885 NORMAN, CONOLLY, F.R.C.P., Medical Superintendent Richmond District Lunatic Asylum, Dublin.

1899 O'BRIEN, C. M., M.D., L.R.C.P. & S., Physician to City Hospital for Diseases of the Skin, 29 Merrion-square.

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1903 PEACOCKE, REGINALD C., M.D. Dub., Medical Officer G.P.O., Blackrock District, 2 Ovoca-terrace, Blackrock.

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† PECHEY-PHIPSON, MARY EDITH, M.D., L.R.C.P., Dasak Bungalow, Nasik-road, Bombay.

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1895 PRICE, ARTHUR GEORGE, M.B., B.Ch. Univ. Dub., Greystones.

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1903 RIDLEY, GEORGE P., L.R.C.P., L.R.C.S., Surgeon King's Co. Infirmary, Tullamore.

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1900 SINCLAIR, F. HOWARD, M.D., Rostrevor Sanatorium, Warrenpoint.

1886 SMITH, ALFRED J., M.B., F.R.C.S.I., Gynæcologist St. Vincent's Hospital, 30 Merrion-square, Dublin.

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1901 SMITH, TREVOR N., F.R.C.S.I., late Assistant Master Coombe Hospital, 34 Upper Fitzwilliam-street.

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1905 STEVENSON, WALTER C., M.B., B.Ch., B.A.O., Assistant Surgeon Dr. Steevens' Hospital, 21 Upper Fitzwilliam-street.

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1902 STOKER, GRAVES, F.R.C.S., Surgeon Drumcondra Hospital, 46 Rutland-square.

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1900 STRAHAN, MICHAEL, L.R.C.S., Medical Officer No. 2 North City Dispensary District, 38 Rutland-square, Dublin.

1902 STRITCH, GEO. S. RUSSELL, L.R.C.P. & S. Ed., L.F.P. & S. Gl., Medical Officer Westmoreland Lock Hospital, 17 North Great George's-st.

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1893 SYMES, WM. LANGFORD, F.R.C.P., M.D., Assistant Physician Dublin Orthopædic Hospital, Physician Homes for Destitute Children, 74 Merrion-square, S., Dublin.

1893 SYMINGTON, JOHNSON, M.D. Edin., Professor of Anatomy Queen's Coll., Belfast. [1]

1895 TAYLOR, EDWARD HENRY, M.D., Dub., F.R.C.S., Surgeon Sir Patrick Dun's Hospital, 77 Merrion-square, Dublin. [1]

1898 TAYLOR, WILLIAM, M.B., F.R.C.S., Surgeon Meath Hospital, and Cork-street Fever Hospital, 47 Fitzwilliam-square [1]

1897 THOMPSON, W. H., M.D., F.R.C.S. Eng., Kings Professor of Institutes of Medicine, Trinity College, Dublin.

1894 THOMPSON, W. J., M.D., Univ. Dub., Physician Jervis-street Hospital, 27 Harcourt-street, Dublin.

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1889 TODD, H. ROSS, F.R.C.S., Ipsden, Wallingford, Berks.

1893 TWEEDY, ERNEST HASTINGS, F.R.C.P., Master Rotunda Hospital. [2]

1900 TWEEDY, HERBERT, L.R.C.P. & S., Colonial Surgeon.

† USHER, ISAAC WILLIAM, L.R.C.S., Medical Officer Dundrum No. 1 Dispensary, Rathdown Union, Tudor House, Dundrum, Co. Dublin.

1901 WATSON, EDWARD J., M.D., M.R.C.P., Anæsthetist and Medical Officer in Charge of the X-ray Department Sir P. Dun's Hospital, Demonstrator in Anatomy T.C.D., 25 Fitzwilliam-place.

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1901 WESTROPP, H. G., L.R.C.P. & S., Visiting Surgeon Home of Rest, Merrion, 115 Strand-road, Sandymount.

1904 WHEELER, W. I. de C., M.D., B.Ch., B.A.O. Dub., F.R.C.S., Surgeon Mercer's Hospital, 59 Lower Mount-street.

1900 WHITE, ARTHUR H., L.R.C.P. & S.I., Professor of Pathology Royal College of Surgeons, Pathologist Meath Hospital and Cork-street Hospital. [1]

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1893 WOODS, ROBERT H., M.B. Univ. Dub., F.R.C.S., Throat Surgeon Richmond Hospital, 39 Merrion-square, Dublin. [1]

1894 WYNNE, ALBERT E., L.R.C.P. & S. Edin., F.R.C.S., late House Surgeon Mercer's Hospital, 27 Westland-row, Dublin.

1884 YOUBELL, M. J., M.R.C.P., 10 Ailesbury-road, Merrion.

# MEMBERS.

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1903 Charles, Andrew, L.R.C.P. & S., 64 Harcourt-street.

1887 Cope, Geo. Patrick, L.R.C.P., L.R.C.S., Medical Officer No. 3 Dispensary District, South Dublin Union, 36 Harcourt-street.

1900 Cullinan, Henry, L.R.C.P. & S., Senior Assistant Medical Officer Richmond Asylum.

1905 Davys, J. H., L.R.C.P. & S.I., Visiting Physician Children's Hospital, Temple-street, 26 Westland-row.

1892 Day, J. Marshall, M.B., Univ. Dublin, Resident Medical Officer Cork-street Fever Hospital, Dublin.

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1894 Eustace, H. M., M.D., Resident Medical Superintendent Hampstead and Highfield Private Lunatic Asylums, Glasnevin.

1897 Fleury, Eleonore Lilian, M.D., R.U.I., Richmond District Asylum, Dublin.

1903 Glenny, Edmund, F.R.C.S., 14 Harrington-street.

1900 Goff, A. S., L.R.C.P. & S., Lynton, Dundrum.

1889 Goulding, H. Benson, F.R.C.S., 16 Rathmines-road.

1898 Hatch, Richard, L.R.C.P. & S., 166 Pembroke-road.

1897 Hughes, Charles, L.R.C.P. & S., 16 Lower Fitzwilliam-street.

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1906 McCaul, George B., M.B., Univ. Dub., Royal Infirmary, Bristol.

1902 Neill, Thomas, M.B., B.Ch. Dub., Ex-Assist. Master Coombe Hospital, 69 Harcourt-street.

1906 O'Hare, John, M.B., Asst. Master National Maternity Hospital.

1905 PASLEY CLAUDE B., L.R.C.P. & S.I., 63 Dalymount, N.C.R.

1898 REDINGTON, JOHN, F.R.C.S., Richmond Asylum.

1885 SHAW, JAMES, L.R.C.S., 93 Talbot-street, Dublin.

1906 SHEILL, J. SPENCER, L.R.C.P. & S.I., Assistant Master Coombe Hospital, 63 Harcourt-street. [1]

1904 STOKES, HENRY, M.B., Dub., Clinical Assistant Meath Hospital, 26 Harcourt-street.

1904 STONEY, R. ATKINSON, M.B., B.Ch., F.R.C.S., Surgeon Royal City of Dublin Hospital, 115 Lower Baggot-street. [1]

1900 TENNANT, ELIZABETH A., L.R.C.P. & S., 15 Harrington-street.

1902 WALSH, JAMES A., L.R.C.P. & S. Edin., 30 Westmoreland-street.

1905 WINDER, FRANCIS A., M.B. Univ. Dub., Glasnevin, Co. Dublin.

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## STUDENT ASSOCIATES.

BUTLER, J. B., B.A., University College, Stephen's-green.

WOOLLCOMBE, ROBERT LLOYD, LL.D., 14 Waterloo-road, Dublin.

# RULES.

1. The name shall be, "ROYAL ACADEMY OF MEDICINE IN IRELAND." (1887.)

*Constitution.*

2. The Academy shall consist of Fellows, Honorary Fellows, Members, and Student Associates.

*Management.*

3. The affairs shall be managed by a Council, consisting of the President, Ex-Presidents (1893), Ex-General Secretaries (1905), the six Presidents of Sections, the General Secretary and Treasurer, the Secretary for Foreign Correspondence, six Secretaries of Sections, and eight Councillors, being two representatives from the Medical, Surgical, Obstetrical, and Pathological Sectional Councils respectively.

*Meetings.*

4. The Meetings shall be General and Ordinary.

*Publication of "Transactions."*

5. The "Transactions" shall be published by the Council, subject to the provisions hereinafter contained.

*Original Fellows and Members.*

6. All the Members of the present Societies (Medical, Surgical, Obstetrical, and Pathological) shall be Original Fellows or Members, without entrance fee, on payment of the annual subscription on or before 31st December, 1882.[a]

*Fellows.*

7. Fellows of the Royal College of Physicians of Ireland, and of the Royal College of Surgeons in Ireland, shall be admitted, without ballot, on payment of the entrance fee and the subscription for the current year. All others, being Registered Medical Practitioners not directly or indirectly engaged in the sale of drugs, shall be proposed by two Fellows, and elected by ballot by the Council.

8. Candidates shall be proposed at one Meeting of the Council, and balloted for at the next—one black bean in four to reject.

8A. That all Rules referring to the admission of Fellows, Members, and Student Associates shall be interpreted as referring to Ladies as well as Gentlemen.

*Privileges of Fellows.*

9. Fellows only shall be eligible for office in the Academy. They shall have the privilege of attending all Meetings of the Academy, of making Communications, and of voting and speaking at such meetings. They shall also receive a copy of the "Transactions."

[a] Those who have paid a Life Subscription to any of the above Societies will be admitted to the privilege of Fellows on payment of Member's subscription

10. These privileges shall not be exercised by any Fellow in arrear with his subscription.

*Honorary Fellows.*

11. Honorary Fellows, limited in number to 25, may be nominated by the Council, and elected, on motion at a General Meeting of the Academy by a majority of at least two-thirds of those present and voting.

*Members.*

12. Any Registered Medical Practitioner may be elected as a Member, the election to be conducted in the same manner as that of Fellows.

*Privileges of Members.*

13. Members shall have the privilege of attending the Ordinary Meetings of the Academy, of making Communications, and of taking part in debate. They can purchase the "Transactions" at cost price.

*Student Associates.*

14. Registered Medical Students may be elected Student Associates for the period of one year. The Subscription must be paid before election, and the Council may elect without notice of motion.

15. Student Associates shall have the privilege of attending the Ordinary Meetings of the Academy.

*Annual Subscription.*

16. Fellows shall pay £2 2s., and Members £1 1s. Student Associates shall pay 5s. The Subscription shall become due on the 1st of October in each year, and if the Subscription be not paid on or before the first Meeting in February, the defaulter shall cease to belong to the Academy, unless the delay shall be accounted for to the satisfaction of the Council. No Fellow shall vote at the Annual General Meeting who has not paid his subscription for the year. Registered Medical Practitioners not residing within 15 miles of Dublin are eligible as Fellows of the Academy on payment of the entrance fee, and an annual Subscription of £1 1s. Medical Officers on the active list of the Royal Navy and Army are eligible for election as "Temporary Fellows" of the Academy on payment of an annual Subscription of One Guinea. Such Temporary Fellows shall enjoy all the privileges of Fellows, except that of voting at General Meetings. No Fellow who has not paid his Subscription shall vote for any Candidate for Office at the Annual General Meeting, nor can the name of any Fellow be received by the General Secretary for insertion on the ballot paper as a Candidate for Office unless his Subscription shall have been paid for the current year.

*Entrance Fee.*

17. After admission of Original Fellows, all Fellows shall pay an entrance fee of £1 1s.

*Council.*

18. The Council shall meet on the last Friday in the month throughout the Session, or oftener should they see occasion—five to form a quorum.

19. Notice of all Extraordinary Meetings shall be transmitted by the Secretary to every Member of the Council. The President or any five Members of Council may call an Extraordinary Meeting of the Council. The Council shall determine questions by vote, or by division if so demanded, the President having a casting vote only. Any regulation of the Council shall have the force of a law, until submitted to the next General Meeting. The Council shall have the power of filling up any vacancies which may occur in the list of Officers of the Academy, except that of President, before the Annual General Meeting. If a vacancy in the office of President should occur, the General Council shall summon a Special General Meeting of the Academy to fill such vacancy. (1888.)

*Sectional Councils.*

20. There shall be six Sectional Councils elected by the Annual General Meeting in October, termed respectively—the Medical, the Surgical, the Obstetrical, the Pathological, the State Medicine, and the Anatomical and Physiological Councils.

21. No Fellow shall be eligible as a candidate for election on more than two Sectional Councils, but no Fellow shall be eligible as a candidate for election on both the Medical and Surgical Sectional Councils. (1888.)

22. Each Sectional Council shall consist of the President of the Section and ten Members, one of whom shall act as Secretary to the Section ; except the State Medicine and Anatomical and Physiological Councils, which shall each consist of a President and six Members. (1888.)

*Meetings of Sectional Councils.*

23. Each Sectional Council shall meet on a fixed day at least one week before the Ordinary Meeting of their Section, three to form a quorum.

*Powers.*

24. Each Sectional Council shall have the power of making any such arrangements as it thinks necessary to carry on the work of the Ordinary Meetings which are under its charge, provided that such arrangements do not interfere with the general laws of the Academy ; and any Rules laid down by such Council shall have the force of laws at the Ordinary Meetings under its charge until submitted to the General Council.

25. Each Sectional Council shall have the power of filling up any vacancies that may occur among its Members until the Annual General Meeting.

*Committee of Reference.*

26. The Council shall appoint a Committee of Reference to report upon morbid growths and other specimens exhibited before the Academy ; of this Committee the Exhibitor shall, for the occasion, be a Member.

*Officers.*

27. A President, to be elected by the Annual General Meeting in October, and to hold office for three years.

28. The Presidents of the Colleges of Physicians and Surgeons for the time being shall be the Presidents of the Medical and Surgical Sections. The Presidents of the other Sections shall be elected by the Fellows at the Annual General Meeting, and shall hold office for two years. (1888.)

29. One General Secretary and Treasurer to be elected at the Annual General Meeting.

30. It is expedient that a fixed salary (of one hundred guineas) shall be paid yearly to the General Secretary in consideration of the fact that the editing of the "Transactions" is part of his duties.

31. One Honorary Secretary for Foreign Correspondence to be elected at the Annual General Meeting. (1888.)

32. The Councillors for each Section to be elected at the Annual General Meeting. Each Sectional Council shall elect two Members to act on the General Council, except in the case of the Sections of State Medicine and Anatomy and Physiology. (1888.)

33. Two Members in each Sectional Council shall retire annually, and be ineligible for re-election for one year, except in the Council of the Section of Anatomy and Physiology, in which only one shall retire. (1896.)

34. Six Secretaries, one for each Section, to be appointed by the Sectional Councils.

35. At all elections after the year 1882, any Fellow desirous of nominating a candidate for election shall, at least ten days before the Annual General Meeting, forward an application to the General Secretary to enter the name of such Fellow on the list of candidates for office, provided that the Fellow so nominated shall have consented to act, and shall have paid his subscription at the time of nomination. Should there be an insufficiency of regularly nominated candidates, the vacancies so created shall be filled up by the Sectional Councils at their first meeting after election. (1891 and 1904.)

36. That all elections shall be by ballot, but Fellows residing more than 15 miles from Dublin, and those incapacitated by illness (to be certified), may record their votes by ballot papers, sent to the presiding officer in sealed envelopes provided for that purpose. A Fellow cannot avail himself of this privilege unless his subscription for the current session has been paid. (1896 and 1904.)

37. That in all elections to the Sectional Councils there shall be affixed to the name of each candidate the number of meetings that he has attended of that particular Section of the Council for which he is now a candidate. (1898.)

*Duties of Officers.*

38. *The President* shall preside at the Annual and Special General Meetings and at General Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888.)

39. *The Presidents of Sections* shall preside at the Ordinary Meetings of the Academy, and shall also preside at the Sectional Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888.)

40. *The General Secretary* shall attend all General Meetings of the Academy and General Council. He shall take minutes of such meetings, to be read at the following meeting.

41. He shall receive and have charge of all papers intended for publication in the "Transactions" of the Academy, after they have been handed over to him by the Secretaries of the several Sections.

42. He shall, on receiving notice from the Secretary of a Section, send out to all the Members notices of the title or titles of the paper or papers for the next Ordinary Meeting, with the name or names of the authors, and, so far as possible, of the subjects for Exhibition, with the names of the Exhibitors.

43. He shall arrange for the Exhibition of specimens and the reading of papers, which are to be forwarded to the Academy by those who are absent, or are not members.

44. The General Secretary and Treasurer shall receive all moneys, and lodge the same in bank to the account of the Academy, and all cheques shall be signed by the Treasurer and one other Councillor.

45. The Accounts shall be audited by two Fellows, not Members of Council, to be appointed by the President at some meeting previous to the Annual Meeting.

*Duties of Secretaries of Sections.*

46. To attend the Meetings of the Council of the Section and the Ordinary Meetings of the Academy, under the management of said Council, and to take minutes at such meetings, to be read at the next following meeting of that Section.

47. To keep such papers as the Sectional Councils recommend for publication, for the purpose of handing them over to the General Secretary.

48. To inform the Secretary of the Committee of Reference of any specimens referred to that Committee, and to transfer the specimens to that Secretary.

49. To give notice to the General Secretary, one week previously to the meeting, of the titles of papers for the evening, the names of the authors, and, so far as possible, the objects for Exhibition, with the names of Exhibitors, so that the General Secretary may inform the Members.

*Meetings.*

50. The Annual General Meeting to take place on the second Friday in October, for the election of Officers and Members of Council, and for the general business of the Academy.

51. Due notice of the meeting shall be given by the Secretary to all Members at least three weeks previously. (1891.)

52. No motion involving a change of these Rules shall be brought before this meeting except one week's notice thereof shall have been given by the Secretary to each Member.

53. The President may—and shall forthwith, on receiving a requisition signed by seven Fellows, at any time—on giving one week's notice, summon a Special General Meeting, for the consideration of particular business, the nature of which must be specified in the letter of summons convening the meeting, and at such meeting no other business can be transacted. In the event of the President being unable, from any cause, or declining, to summon a Special General Meeting of the Academy, it shall be in the power of the General Council to summon such meeting. (1888.)

*Ordinary Meetings.*

54. The communications to be submitted to the Ordinary Meetings shall be grouped under the following heads :—Medicine, Surgery, Pathology, Obstetrics, State Medicine, and Anatomy and Physiology ; and the conduct of such meetings shall be in the hands of the several Sectional Councils, each Sectional Council to have the management of the Ordinary Meeting in rotation, as arranged by the General Council. (1888.)

55. The Ordinary Meetings shall be held on every Friday evening, from the last Friday in October until the last Friday in May, inclusive, at eight o'clock, except during the Christmas and Easter recesses.

56. All Fellows, Members, and Student Associates attending the meetings shall write their names in the attendance book.

57. Any Fellow or Member may introduce two Visitors by cards obtained from the Sectional Secretaries.

58. Officers of the Army or Navy Medical Departments shall, on presenting their cards, be admitted to the Ordinary Meetings of the Academy.

59. No communication shall exceed twenty minutes in its delivery, nor any speech thereon ten minutes, except by permission of the Chairman. No one shall speak twice upon the same communication, except the author, who has the right of reply.

60. A paper by any other than a Fellow or Member of the Academy shall not be read before the Academy unless the author of such a communication shall have obtained permission to do so from the Council of the Section before which the communication is proposed to be read. (1892.)

*Ordinary Meetings.—Order of Business.*

61. (1.) Chair to be taken at 8 30 p.m.

(2.) Chairman to read list of specimens, &c., exhibited by card, together with the names of the Exhibitors.

(3.) No Pathological Specimen shall be exhibited at any Section other than the Pathological and Obstetrical, except by card. This Exhibition shall not exclude any subsequent communication regarding it at the Pathological Section.

(4.) There shall be no Exhibition of Specimens by card in the Pathological Section.

(5.) Any member shall have liberty to exhibit any recent specimen at any of the meetings of the Obstetrical Section, provided it illustrates any question in gynæcology.

(6.) At the meetings of the Obstetrical Section recent specimens may be exhibited, and the President may invite discussion thereon, provided that such exhibition of specimens or discussion, if any, thereon, must terminate at 9 o'clock, p.m., but that, if necessary, they may be resumed after the papers for the evening have been read and discussed.

(7.) Chairman to ask if any member has any observations to make or motion to propose relative to any living specimen on the List of Exhibition.

(8.) Chairman to call upon the author of the first paper on the list to read his paper.

(9.) Chairman to call upon members to discuss the paper, or, at his discretion, to take any other paper or papers on the list relating to the subject, and have the discussion subsequently on all such papers collectively.

(10.) When the last paper has been discussed, the Chairman to ask if any member desires to speak upon any of the specimens exhibited by card.

(11.) After the discussion upon any specimen, the Exhibitor has the right of reply.

*Regulations regarding the Exhibition of Specimens by Card.*

62. (1.) Any member may exhibit by card at any Ordinary Meeting, except at the meeting of the Pathological Section. At the meetings of the Pathological Section all specimens must be presented and described *viva voce*, and debate may be invited thereon.

(2.) Notice shall, if possible, be given to the General Secretary, or the Secretary of the Section, on or before the previous Ordinary Meeting.

(3.) Specimens must be in the room at 7 45 on the night of Exhibition.

(4.) Specimens for Exhibition by card shall be open for inspection at 8 p.m.

(5.) A card, containing all particulars for publication, shall be placed with the Specimen. Cards for this purpose are to be obtained from the Secretary.

(6.) The Exhibitor should be present, and he shall furnish further details if asked for.

(7.) Every Exhibitor shall submit the Specimen or Specimens on view to the Committee of Reference, if the meeting so decide.

*Exhibition of Pathological Specimens.*

63. No lengthened reference to treatment shall be allowed upon any Specimen, except by the express permission of the Chairman. Whenever it has been agreed that a Specimen exhibited at a Sectional Meeting of the Royal Academy of Medicine in Ireland shall be sent to the Reference Committee to report thereon as to its nature, the Exhibitor is to retain the custody of the specimen until he shall be summoned to a meeting of said Committee to be convened by its Secretary, on an early day, when he will attend and submit it for examination. (1889.)

*By-laws concerning "Transactions."*

64. The "Transactions" shall consist of such Communications made to the Academy by or through Fellows or Members as may be deemed by the General Council suitable for publication; also, of discussions of importance or interest arising out of such Communications.

65. All Communications accepted by the Academy become the property of the Academy, but authors may also print their Communications, subsequent to the reading of the same before the Academy, in any publication in addition to the "Transactions." Papers shall be handed to the Secretary of the Section immediately after they have been read. (1891.)

66. The "Transactions" for the year shall be presented to all Fellows of the Academy who have paid their Annual Subscriptions.

67. The "Transactions" may be purchased by Members at cost price.

68. The Publication Committee of each Section shall meet not later than the Tuesday after each meeting of the Section, for the purpose of abstracting the proceedings—the abstract to be placed in the printer's hands on same evening, and forwarded to the editors of medical journals with the least possible delay. (1888.)

69. Contributors of papers may send their papers to the Academy printer early enough to allow of their being put in type before the meeting, provided the author be responsible for the cost of same should the General Council deem the communication not suitable for publication in the "Transactions."

70. That on the evening of the day of meeting of the Sectional Council, when the papers for the next meeting have been decided upon, a circular be sent to each contributor by the Secretary of the Section informing him :—

(1.) That he is expected to be ready or else take his place at the bottom of the list.

(2.) That he must have an abstract ready with his paper, otherwise he will be noted in the published proceedings in such form as the Publication Committee think fit.

71. The General Council is empowered to defray the expenses in whole or in part of any illustrations which it may consider advantageous to the elucidation of the papers published by the Academy.

72. An abstract (prepared by the author) of each communication made at the Academy, along with a report of the discussions thereon, shall be furnished to the editors of such medical journals as may desire to publish them, and the authors of such communications shall be empowered to publish their papers *in extenso* in any periodical or periodicals they may think fit, such communications also to appear in the "Transactions," provided the Council consider them worthy of insertion.

*Expulsion of Fellow or Member.*

73. Expulsion of a Fellow or Member can take place only at a General Meeting of the Academy, on the motion of the Council, if two-thirds of the Members present shall vote for the same by ballot. Of such ballot the Council must give at least fourteen days' notice in writing to every Fellow of the Academy.

*New Laws.*

74. New Laws, or alterations in existing Laws, can be proposed only at the Annual General Meeting. Any Fellow proposing such alteration shall give notice to the General Secretary at least ten days before the General Meeting in October.

# REPORT.

THE General Council reports that the number of Fellows for the Session 1904–5 was 223, of Members 31, and of Student Associates 16. The Fellows increased by four, the Student Associates by five, and the Members decreased by one.

The improvement in the financial condition of the Academy, which began with the appointment of the Special Finance Committee three years ago, still continues.

The credit balance in the bank now stands at £61 5s. 9d., and although this amount is less by £23 0s. 4d. than appeared in the balance sheet of last year, the cost of printing and circulating the Transactions of the past, as well as those of the previous Session, amounting in all to £226 12s. 8d., has been met within the past financial year.

During the first half of the Session the weekly abstracts were furnished free of cost by the *Medical Press and Circular*, and for the second period they were printed by Mr. J. Falconer, also without any expense to the Academy.

The Council had under consideration during the Session a number of recommendations made by a Committee of the Sectional Secretaries, which was appointed to consider what means might be taken to increase the interest of Members in the scientific work of the Academy.

The most important recommendation made by this Committee was a suggestion that all the scientific meetings of the Academy should have the various interests represented at each meeting—in other words, it was proposed to do away

with the Sections. The Council agreed to a modification of this proposal, and recommends the following:—

(1.) That certain meetings in each Session should be general—*i.e.*, different interests being represented at such meetings.

(2.) That living specimens and recent *post-mortem* specimens may be exhibited by permission of the Sectional President and Secretary without notice thereof appearing on the Agenda Paper.

(3.) That rules 59 and 70 be enforced.

The Council regrets to state that although the action of the Coroner for the County Dublin in connection with the inquest held by him at the Royal City of Dublin Hospital on April 8th, 1904, was brought under the notice of the Lord Chancellor by the Royal College of Physicians of Ireland, his Lordship stated he had no power to interfere in the matter.

At the request of the Reception Committee which is in charge of the arrangements for the proposed visit of the British Association to Dublin in 1907, the Council nominated your President to represent the Academy on the Executive Committee.

The Council records with regret the loss the Academy has sustained by the death of the following Fellows:—Professor Ambrose Birmingham, Dr. J. Lilly Lane, Dr. Charles F. Moore, Dr. Lush, Dr. W. C. Neville, Professor Tichborne, and Dr. Browne (Delgany).

## General Treasurer's Report for the Session 1904–1905.

| RECEIPTS. | £ | s. | d. |
|---|---|---|---|
| To Balance in Bank | 84 | 6 | 1 |
| ,, Subscriptions and Entrance Fees | 443 | 2 | 0 |
| ,, Dividends on £596 2s. 4d. 2¼ per cent. Consolidated Stock and £155 1s. 10d. New 2½ per cent Government Stock | 18 | 0 | 8 |
| ,, Sale of Transactions | 3 | 10 | 0 |
| Total | £548 | 18 | 9 |

| EXPENDITURE. | £ | s. | d. |
|---|---|---|---|
| By General Secretary | 105 | 0 | 0 |
| ,, Printing, Stationery, and Postage | 68 | 15 | 4 |
| ,, Transactions, Vol. XXI. | 4 | 18 | 3 |
| ,, Do., Vol. XXII. | 122 | 6 | 9 |
| ,, Do., Vol. XXIII. | 104 | 5 | 11 |
| ,, Royal College of Physicians | 15 | 15 | 0 |
| ,, Royal College of Surgeons | 15 | 15 | 0 |
| ,, Reporter | 12 | 1 | 6 |
| ,, Servants | 20 | 10 | 0 |
| ,, Groceries and Milk | 13 | 3 | 11 |
| ,, Lantern | 5 | 5 | 0 |
| ,, Care of Microscopes | 2 | 0 | 0 |
| ,, Sundries | 2 | 16 | 4 |
| ,, Balance in Bank | 61 | 5 | 9 |
| Total | £548 | 18 | 9 |

The Capital is invested in the names of Sir William Thomson, Dr. Walter G. Smith, and Dr. James Craig.

We have examined the Accounts and Vouchers, and certify the same to be correct.

*30th September, 1905.*

C. A. BALL.
T. GILLMAN MOORHEAD.

*Volume XXIII. of the "Transactions" has been forwarded to the following:—*

**IRELAND:—**

| | |
|---|---|
| Medical Press | Dublin. |
| National Library | Do. |
| Queen's College | Belfast. |
| Do. | Cork. |
| Do. | Galway. |
| Royal College of Physicians | Dublin. |
| Royal College of Surgeons | Do. |
| Royal Irish Academy | Do. |
| Royal Dublin Society | Do. |
| Royal University | Do. |
| Trinity College | Do. |

**ENGLAND:—**

| | |
|---|---|
| Birmingham Medical Review | Birmingham. |
| Medical Institute | Do. |
| Bristol Medico-Chirurgical Journal | Bristol. |
| University of Durham College of Medicine | Newcastle-on-Tyne. |
| Liverpool Medico-Chirurgical Journal | Liverpool. |
| Journal of Obstetrics and Gynæcology, 60 Chandos-street, W.C. | Do. |
| King's College | Do |
| Lancet | Do. |
| Library, British Medical Journal, 429 Strand | Do. |
| Lister Institute of Preventive Medicine, Chelsea Gardens | Do. |
| Medical Magazine, 62 King William-street, E.C. | Do. |
| Medical Review | Do. |
| Official Year Book of Scientific and Learned Societies, Exeter-street, Strand | Do. |
| Public Health, 19 Bloomfield-road, Maida Vale | Do. |
| Royal College of Physicians | Do. |
| Royal College of Surgeons | Do. |
| Royal Medical and Chirurgical Society, Hanover-square | Do. |
| University of London, South Kensington | Do. |
| University College, Gower-street, E.C. | Do. |
| Victoria University | Manchester. |

**SCOTLAND:—**

| | |
|---|---|
| University | Aberdeen. |
| University College | Dundee. |
| Royal College of Physicians | Edinburgh |
| Royal College of Surgeons | Do. |
| University | Do. |
| Faculty of Physicians and Surgeons | Glasgow. |
| University | Do. |
| Do. | St. Andrews. |

**EUROPE:—**

| | |
|---|---|
| University | Amsterdam. |
| Naturforschende Gesellschaft | Basel. |

**EUROPE**—*con.*—

| | |
|---|---|
| University Library | Berlin. |
| University College | Bologna. |
| Académie Royale de Médecine de Belgique | Brussels. |
| L'Année Chirurgicale | Do. |
| Société Belge de Chirurgie | Do. |
| Université Libre | Do. |
| University College | Christiania. |
| Académie de Médecine | Copenhagen. |
| La Grèce Medicale, Syra | Greece. |
| University College | Madrid. |
| Archivio di Ortopedia | Milan |
| Académie de Médecine | Paris. |
| Archives Orientales | Do. |
| Revue de Chirurgie | Do. |
| University of Paris | Do. |
| Imperial University | St. Petersburg. |
| Royal Carolinska Med. Chir. Institution | Stockholm. |
| University Library | Strasburg. |
| Archivie Italiano di Otologia | Turin. |
| Medical Society, Royal University | Upsala. |
| University | Vienna. |
| Naturforschende Gesellschaft | Zurich. |

**AMERICA** :—

| | |
|---|---|
| Johns Hopkins University | Baltimore. |
| Journal of Medical Research | Boston, Mass. |
| Brooklyn Medical Journal | Brooklyn. |
| McGill University | Montreal |
| Academy of Medicine, 17 West 43rd Street | New York. |
| University | Do. |
| Journal of Mental Pathology | Do. |
| American Medical Association | Philadelphia. |
| College of Physicians | Do. |
| University of Pennsylvania | Do. |
| University Lavel | Quebec. |
| University of Toronto | Toronto. |
| Charlotte Medical Journal, Charlotte, N. C. | United States. |
| Library, Surg.-General's Office, Washington | Do. |
| Journal of Comparative Neurology, Denison University, Granville, Ohio | Do. |
| Medical Library Association, 19th and Stout-streets, Denver, Colorado | Do. |

**AUSTRALASIA** :—

| | |
|---|---|
| University | Adelaide. |
| Do. | Auckland. |
| Do. | Melbourne. |
| Inter-Colonial Medical Journal | Do. |
| University of Otago | New Zealand. |
| The Australasian Medical Gazette, | Sydney, N.S.W. |
| University of Sydney, care of Young J. Pentland, 38 West Smithfield, London, E.C. | Do. |

**ASIA** :—

| | |
|---|---|
| Bombay University | Bombay. |
| University | Calcutta. |
| Imperial University Library | Tokio, Japan. |
| Government Laboratory | Manilla, P.I. |

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TRANSACTIONS

OF THE

ROYAL ACADEMY OF MEDICINE IN IRELAND.

## SECTION OF MEDICINE.

# (*A*) ON SOLUBILITY, AS APPLIED TO URINE.
# (*B*) ON THE THEORY OF GOUT—A PROTEST.

By WALTER G. SMITH, M.D., F.R.C.P.I.;
Physician to Sir Patrick Dun's Hospital.

[Read in the Section of Medicine, November 10, 1905.]

Urine is a complex aqueous solution of different kinds of molecules, which may be broadly classified into two groups:—

*Group I.*—Non-ionised molecules, which conserve their integrity in solution—*i.e.*, are not dissociated, or only so to a trifling extent. These are represented in normal urine chiefly by urea and kreatinin. In pathological urines they are represented by such compounds as sugars and proteids. These non-ionised molecules are electrically neutral, and are non-conductors of electricity.

*Group II.*—But urine is an electrolyte—*i.e.*, a conductor of electricity. It owes this property to the fact that it contains molecules which are more or less freely dissociated into ions, or sub-molecules, the carriers of electric charges.

Electro-positive ions are marked "·"; electro-negative are marked "′."

In normal urine the H· ions and the OH′ ions are nearly balanced. As a rule, however, the H· ions (derived mainly from the acid phosphates of the alkalies) slightly preponderate. Hence, the usually acid reaction to litmus of urine. Yet the amount of H· ions is not adequate to affect certain other indicators—*e.g.*, Congo red and tropœolin. These indicators are readily altered in colour by the stronger (*i.e.*, more dissociated) acids—*e.g.*, HCl—and this is what is really meant by saying that normal urine does not contain a free acid. An amphoterous urine is one in which the H· ions and the OH′ ions counterbalance each other in regard to their action on blue and red litmus paper, each ion producing a feeble action on its own account.

The principal classes of salts in urine which belong to Group II. are :—

(1) Chlorides—*e.g.*, sodium chloride (NaCl). Ions=Na·. and Cl′.

(2) Sulphates—*e.g.*, potassium sulphate, final ions=K· ; K· ; and $SO_4''$.

(3) Phosphates—*e.g.*, sodium phosphates :—$Na_3PO_4$. $Na_2HPO_4$. $NaH_2PO_4$. Ultimate ions=Na· (1, 2, or 3 atoms) and $(PO_4)'''$.

(4) Carbonates—*e.g.*, potassium carbonates, $K_2CO_3$ : $KHCO_3$. Final ions=K· ; K· ; H ; and $CO_3''$.

(5) Urates—*e.g.*, (acid), sodium urate, $NaC_5H_3N_4O_3$. Ions =Na· and (Ur)′ (monobasic radical of uric acid).

Now many important clinical and pathological conditions of urine are related to, and depend upon, the relative solubility of certain compounds under different conditions, and, in the remarks that follow, I wish to look at familiar facts from this point of view, chiefly with the object of assisting beginners in the study of clinical medicine. A few simple general rules of

solubility of urinary salts can be stated, which, when once thoroughly apprehended, will save the novice from many blunders.

It is essential to note the elementary fact that the common words, "neutral," "alkaline," and "acid," as applied to salts, are ambiguous, and are apt to be loosely used in two different senses :—

(*a*) In reference to action upon litmus, any salt that reddens blue litmus is styled *acid*, and any substance that blues red litmus is termed *alkaline*.

(*b*) But the technical or chemical sense of these words is briefly this :—A *neutral* (better, *normal*) salt is one in which the valencies of the basic and acid radicals exactly counterpoise in worth. Thus : $Na \cdot Cl'$ : $K_2 \cdot (SO_4)''$ : $Na_2 \cdot (CO_3)''$ : $Na_3 \cdot (PO_4)'''$.

Some neutral (normal) salts strongly redden blue litmus, *e.g.*, $CuSO_4$. Others—*e.g.*, $Na_3PO_4$—blue red litmus.

An *acid* salt is derived from any acid with a valency higher than one—(*i.e.*, polybasic) by *partial* replacement of hydrogen by a metal—*e.g.*, from carbonic acid, $H_2CO_3$, we have $NaHCO_3$ (acid—or bi-carbonate of sodium). From sulphuric acid $H_2SO_4$, we can get $KHSO_4$ (acid or bi-sulphate of K.). From phosphoric acid, $H_3PO_4$, either $Na_2HPO_4$ (monohydric, or disodium, phosphate) and $NaH_2PO_4$ (dihydric, or monosodium, phosphate).

The term alkaline salt is ambiguous, for it may mean either—(1) A salt of an alkali radical (K : Na : $NH_4$) considered irrespective of its action on litmus ; or (2) a salt that blues red litmus.

Now $Na_2HPO_4$ and $NaH_2PO_4$ are both salts of the alkali metal, sodium, and are both, technically, acid salts. Yet the former salt ($Na_2HPO_4$) blues red litmus, and the latter ($NaH_2PO_4$) reddens blue litmus, and is the chief contributor of the surplus hydrogen ions which cause the acid (litmus)

reaction of ordinary urine. These seeming paradoxes can be elucidated by the dissociation hypothesis.

### RULES FOR SOLUBILITY.

(1) *Chlorides.*—All chlorides which occur in normal or pathological urines are soluble in water They never, therefore, occur in urinary deposits or concretions.

All metallic chlorides are soluble in water, except calomel, white precipitate, and silver chloride.

(2) *Sulphates.*—The sulphates of the urine are soluble in water. Calcium sulphate is the least soluble, and has very rarely been observed in a sediment. All metallic sulphates are soluble, except those of barium, strontium, and lead.

Sulphates and phosphates are insoluble in strong alcohol. Hence the white zone of opacity when strong alcohol is floated on urine. The chlorides are soluble in spirit.

(3) *Phosphates.*—(*a*) All possible phosphates of the alkali radicals alone (K : Na : $NH_4$) are readily soluble, and are never found in deposits.

(*b*) All the *normal* (neutral) phosphates of other metals are insoluble—*e.g.*, calcium, $Ca_3(PO_4)_2$; magnesium, $Mg_3(PO_4)_2$; and ammonio-magnesium phosphate, $MgNH_4(PO_4)$, miscalled "triple phosphate."

(*c*) *Acid* (*i.e.*, mono- and di-hydric) phosphates of calcium and magnesium are generally readily soluble, except $CaHPO_4$ (mono-calcic phosphate). This salt forms the "stellar phosphate" crystals not infrequently met with in urine. These crystals sometimes appear as an iridescent film upon neutral or alkaline urine which has stood for some time. All these phosphates are soluble in acetic acid. By heat, the soluble acid phosphates of Ca and Mg (especially in feebly acid or neutral urines) are often precipitated as tri-calcic (and magnesic) phosphates owing to a thermal molecular rearrangement.

(*d*) Ferric phosphate (grey-white precipitate on adding $Fe_2Cl_6$ to urine), unlike the other phosphates, is not appreciably soluble in dilute acetic acid. Dilute HCl dissolves it and every other phosphate likely to be met with in clinical testing.

(4) *Carbonates.*—All possible carbonates of the alkali radicals (K : Na : $NH_4$) are readily soluble, and never occur in deposits or calculi.

*Normal* carbonates of other metals—*e.g.*, Ca and Mg—are insoluble, and not infrequently occur in urinary sediments, associated with Ca and Mg phosphates.

*Acid* (bi)carbonates of Ca and Mg are soluble.

(5) *Urates* (lithates).—(*a*) Mono-metallic (acid-, bi-, quadri-) urates form the common uratic pink, or reddish deposits. According to Luff, the composition of the amorphous urate sediment is a mixture of quadri-urates of $NH_4$, Na, and K in the relative proportion of 7, 5, and 1 molecules.

These urates are sparingly soluble in the cold, but are easily brought into solution by gently warming the urine to a temperature far below that needed for the coagulation of proteids. No other inorganic deposit in the urine behaves similarly.

The most abundant constituent of uratic sediments is (acid) urate of sodium ($NaC_5H_3N_4O_3$). Its solution in water feebly blues red litmus, and reddens phenol-phthalein. The solubility of (acid) urates is closely dependent upon not only temperature but also upon the grade of acidity of the urine. Acidification to the extent of one single drop of dilute acetic acid will frequently cause opacity in a bright and clear urine owing to precipitation of the acid urates. Conversely, Roberts has shown that the addition of an exceedingly minute quantity of an alkaline carbonate—not sufficient to sensibly affect the reaction of urine to litmus—notably inhibits the precipitation of uric acid from normal acid urines (*Croonian Lectures*, 1892,

p. 53); so narrow is the border line between solubility and insolubility.

No salts of the alkali metals alone other than (acid) urates ever occur in urinary sediments or calculi.

(*b*) Di-metallic (normal) urates are formed at once when a little liq. potassæ is added to a deposit of urates. The precipitate clears up because normal urates are very soluble.

But they are very unstable in aqueous solution, and are even decomposed by $CO_2$ gas. Hence they do not, and, indeed, could not, occur physiologically in the urine, or fluids of the body, although their presence is sometimes erroneously assumed by writers. They can exist in solution only in presence of an excess of alkali, and cannot, therefore, come into any rational theory of gout, or of calculous formations.

Assuming the ordinary view that uric acid is dibasic—*i.e.*, contains 2 atoms of replaceable H—we may classify urates thus :—

(*a*) *All* the H of uric acid replaced by metal—*i.e.*, $M_2\overline{U}$ = normal (neutral) urates. These never occur in the human body.

(*b*) *Half* the H replaced = $MH\overline{U}$ = the so-called acid (bi-urates). Frequently precipitated as gravel and calculi.

(*c*) *One quarter* of the H replaced—*i.e.*, $[MH\overline{U}.H_2\overline{U}]$ = quadri-urates. Probably the form in which urates exist in the blood.

(6) *Nitrates*.—All normal metallic nitrates are soluble in water.

Nitrate of urea is readily soluble in water, but is insoluble in *pure strong* nitric acid. Hence, the crystalline zone of urea nitrate often observed (especially in high-coloured febrile urines) when urine is *carefully* floated over the acid. Impure yellow nitric acid decomposes urea with copious evolution of nitrogen and $CO_2$ gases.

To sum up, the three simple, but essential, points for the student to grasp are these :—

(*a*) The behaviour of the deposit to water, cold and hot.

(*b*) The action of dilute acids upon the deposit.

(*c*) The action of caustic alkalies (*e.g.*, liq. potassæ) upon the deposit, or calculus (powdered).

## GOUT AND URIC ACID.

Among pathological questions relating to solubility, a foremost place is taken by uric acid and its compounds. Furthermore, we have to take into account the physiological genesis of uric acid, which is still but imperfectly understood. But this point has a less direct bearing on clinical and pathological problems. It may safely be said that few suppositions have longer dominated medical thought, influenced daily practice, and guided popular opinion more extensively, than the uric acid theory of gout. Yet some clinical observers, with whom I entirely associate myself, have long and increasingly, felt convinced that this theory is inadequate, and, what is worse, misleading in practice. No doubt it will take time to shatter this idol of popular esteem, and a respectable family heirloom like gout, which claims as its victims "more wise men than fools" (Sydenham), is not to be too lightly spoken of.

The three chief nitrogenous constituents of urine are urea, uric acid, and kreatinin.

(1) The origin of urea is almost exclusively endogenous.

(2) Uric acid is partly derived from the food (exogenous), and partly from the body metabolism (endogenous). About 50 per cent. of the endogenous uric acid appears in the urine, the rest is broken up.

(3) Kreatinin (including kreatin) is mainly exogenous in origin, but some is doubtless formed in the body.

If it were not for the sparing solubility of uric acid and of its salts, in virtue of which they become readily visible or palpable, it is certain that we should hear much less of them in pathology, and all troubles attributed to their mechanical

agency would, *ipso facto*, vanish. On the other hand, leaving urea out of consideration, we hear nothing at all of the pathological significance of kreatinin, because it is never thrown down in an insoluble form in nature. Yet it contains 37 per cent. of nitrogen, nearly 4 per cent. more than uric acid, and its daily excretion ranks as equal to, if not greater than, that of uric acid—viz., 0.5 to 1 gram. Supposing that kreatinin, whether of endogenous or exogenous origin, was familiar to us as a precipitate, and if there were any simple means of estimating its amount and the ratio of its exogenous and endogenous excretion, I am sure that we should speedily have a copious literature, and all sorts of plausible hypotheses would crystallise into existence.

Let us now look more closely at uric acid itself, for surely the most promising road to an improved therapeutics of gout lies through a fuller and more accurate knowledge of the chemistry and physiological reactions of uric acid and the urates (Roberts). When uric acid was first isolated by Scheele, in 1776, its chemical position was ill understood. If it had so happened that it was a recent discovery, it might possibly have been baptised by some indifferent name, just as we say leucin instead of amido-caproic acid. Most people know now that uric acid is a member of a group of substances which are commonly termed, after Emil Fischer, the purin bodies, because they are all built upon a fundamental nucleus called *purin*, $C_5N_4H_4$. By some writers these bodies are styled alloxur bodies (or bases), or xanthin bodies. Kossel was the first to establish the close chemical connection between nucleins and the xanthin or purin bodies. The purin compounds of ordinary occurrence are hypoxanthin, xanthin, uric acid, caffein, and theobromin, with some others of less note. In some of these compounds the acidic character, in others the basic character, predominates, and some are amphoterous in reaction. It would simplify matters considerably if physi-

ologists and pathologists could be induced to recognise, and to teach, that uric acid behaves essentially as a weak *monobasic acid*, instead of the usual statement that it is a dibasic acid. Remsen (*Organic Chemistry*, 1889, p. 204) calls it a monobasic acid, but his good example is not generally followed. So far as human physiology and pathology are concerned, it *never behaves otherwise* than as a monobasic acid, and the so-called *acid urates* are the only salts which have any interest for us. They should be simply styled urates. How stand the chemical facts?

(1) The empirical formula of uric acid is $C_5H_4N_4O_3$. It has been shown that, under special conditions, all four atoms of hydrogen are replaceable by basic radicals—*i.e.*, uric acid is potentially tetrabasic. The existence of the compound $C_5K_2(CH_3)_2N_4O_3$ demonstrates this (Wade, *Organic Chem.*, 1898, p. 199).

(2) In presence of an excess of caustic alkali, two atoms, not more, of H can be replaced by metals. By this means, and this only, can we artificially prepare the so-called normal (neutral) urate. They never have been, and, I firmly believe, never will be, proved to exist in the human body, which represents a feebly alkaline medium, rich in carbonates.

(3) The ordinary urates are typified by sodium urate $Na\bar{U}r$ ($\bar{U}r=C_5H_3N_4O_3$). In the notation commonly used, this urate is written NaHU ($U=C_5H_2N_4O_3$). The former mode of representation is simpler and more consonant with clinical facts. Uric acid in saturated watery solution is only slightly dissociated—*i.e.*, furnishes very few H ions. Its dissociation value amounts to only 9.5 per cent. (His and Paul). This corresponds to a limited ionic dissociation of one atom of H, and the negative acid residue functions as a weak monobasic acid. The ions are, $H^{\cdot}$ and $(C_5H_3N_4O_3)'$. So feeble is its acidity that even a warm aqueous solution scarcely reddens blue litmus, or decolourises reddened phenolphthalein, and a solution of acid urate of sodium turns red

litmus blue. The acidity of uric acid is about $\frac{1}{12}$th that of acetic acid (Cohen, *Physical Chem.*, 1903, p. 252). The determination of the solubility of uric acid and its salts in water and the influence of other substances upon their solubility are of prime importance. That the problem is more difficult than might at first sight appear is apparent from the extraordinary discrepancies in the data published by various authorities. Thus, Prout and Mitscherlich placed the solubility of uric acid, in the cold, as 1 in 10,000 parts of water; Henry, as 1 in 1,720; and Nicolaier, as 1 in 6,000 at 18° C. Dr. W. His, junr., and T. Paul have investigated this problem in a very thorough and exact manner, making use of the recent methods of physical chemistry. For details of procedure, and for the theoretical discussion, I must refer to their admirable papers in the *Zeitschr. f. physiolog. Chemie*, Bd. XXXI., 1 and 64; and also to Höber, *Physikal. Chemie der Zellen und der Gewebe*, 1902. One or two only of their conclusions may be quoted.

*Solubility.*—The degree of solubility of pure uric acid in carefully purified water at 18° is almost exactly 1 part in 40,000—a much lower estimate than any hitherto given. This is equivalent to saying that in one litre of the saturated solution there is 0.0253 gram of uric acid; or, if preferred, one molecule (168.2 gram) of uric acid in 6,640 litres of saturated solution.

*Decomposition.*—His and Paul confirm the older statements that uric acid undergoes gradual decomposition by contact with water, especially as the temperature rises. In consequence thereof its solubility increases. Its electrical conductivity also becomes greater, pointing to an increase in the number of ions. The precise changes are not known with certainty, but it is probable that uric acid is partially converted into urea and dialuric acid, $C_4H_4N_2O_4 = CO\frac{NHCO}{NHCO}CHOH$.

*Effect of other Acids.*—Widely different data may be found in physiological literature upon the influence which the addition of HCl has upon the solubility of uric acid in water. While Rüdel and Smale assume that such an addition increases the solubility, Zabelin states that it has no effect (Cohen *Physical Chem.*, 1903, p. 249). But, from the principles of physical chemistry, and from Guldberg and Waage's law of mass-action, it can be foreseen what will happen when HCl is added to a saturated solution of uric acid. For it is undoubtedly true that the addition of a strongly dissociated acid, such as HCl or $H_2SO_4$, must *decrease* the solubility of uric acid in water, and His and Paul have proved this experimentally.

*Urate of Sodium*, the ordinary gouty deposit in the tissues.—This salt is not decomposed by boiling water. His and Paul have determined its solubility to be such that one litre of water at 18° C. contains only 0.004355 of a gram-molecule (208 grams) of the salt. At a temperature of 37.6° (100° F.), Roberts states that the solubility of sodium urate is approximately 1 in 1,000. Observe now that, just as the addition of a little HCl (*i.e.*, hydrogen ions) depresses the solubility of free uric acid, so surely will the addition of any extra *sodium* ions lower the solubility of sodium urate by diminishing its dissociation.

This fact is of great practical importance for two reasons: (*a*) On account of the sodium content (NaCl and $NaHCO_3$) of the serum from which the uratic deposits of gout are thrown down. The amount of NaCl in the blood is sufficient to reduce the solubility of acid sodium urate to less than one-tenth of its proper solubility in water; (*b*) on account of the common therapeutic practice of administering alkalies in the treatment of gout. Physical chemistry teaches us that the administration of an alkaline sodium salt—*e.g.*, $NaHCO_3$—will have precisely the opposite effect to that intended, for,

instead of increasing, it will lower the solubility of the salt. So that alkaline (sodium) treatment of gout is not only useless, but may actually be harmful. Sir W. Roberts arrived at similar conclusions long ago (*Croonian Lect.*, p. 78), and it is very satisfactory to find his acute inferences confirmed by the revelations of physical chemistry, a branch of science unborn in his time.

If, then, it can be really shown that such alkaline mineral waters as Neuenahr, Vichy, and Contrexéville have a beneficial action in gouty conditions, we must seek for an explanation other than that usually given. But it is well to note that the therapeutics of gravel (calculus) differs essentially from that of gout.

In gout, the error occurs on *this* side of the kidneys, in the blood and tissues; in gravel (calculus), the error occurs on *that* side of the kidney (Roberts). Neither Garrod nor Roberts could recall a single instance in which a paroxysm of gout and a paroxysm of uric acid gravel broke out synchronously. The above considerations apply with added force in regard to attempts to dissolve renal calculi by alkaline remedies. The physician may strive to *prevent* the formation of calculi, but only the surgeon can remove them. It would be wearisome to bring forward analogous reasons for rejecting as futile other remedies such as lithium salts, piperazin, *et hoc genus omne*, in the treatment of gout. As Osler (p. 417) pithily puts it: "Much of the humbuggery in the profession still lingers about mineral waters, more particularly about the so-called lithia waters." The compounds which piperazin forms with uric acid in aqueous solution behave like urates.

It can scarcely be maintained that the treatment of gout on the old lines is satisfactory.

Last year Prof. von Noorden, of Frankfort, who is a skilled physiological chemist, as well as a trained and rational

clinical observer, opened a discussion at the meeting of the B. M. A. upon the chemical pathology of gout (*Brit. Med. Journal*, September 24, 1904), and in the *Brit. Med. Journal* for January 21, 1905, Dr. Chalmers Watson, in a luminous paper advanced weighty, and to my mind convincing, reasons for abandoning the uric acid theory of gout. The difficulties connected with this theory may be arranged under these heads :—

(1) Estimation of uric acid.
(2) Pathological occurrence of uric acid.
(3) Experiments on the toxicity of uric acid.
(4) Pathological investigation of gout in man and in the lower animals.

(1) *Estimation of Uric Acid.*—Quantitative determinations of the minute amount of uric acid which normally occurs in blood are difficult; and, even in the urine, they are not very easy to carry out; at any rate, clinically. The limits of excretion of uric acid in gouty and non-gouty people are much the same, and the uric acid content of the blood does not vary in a typical manner with the phases of gout (von Noorden). It is, of course, understood that uric acid never occurs *free* in the blood. Probably it circulates in the form of quadriurate (Roberts).

(2) *Pathological Occurrence of Uric Acid.*—Uric acid has been demonstrated to exist in the blood in weighable quantity in a number of diseased states which have no known relationship to gout (Watson)—*e.g.*, chronic Bright's disease, malignant disease, aneurysm, lobar pneumonia, &c. It is also well known that in leukæmia uric acid may be present in the blood to a larger extent than occurs even in aggravated cases of gout, and yet we find no uratic deposits, or other evidence of gout. Dr. Chalmers Watson and others have clearly shown that in gout there is no marked disturbance in the uric acid elimination before, during, or after the paroxysm. Von Noorden has proved that, on a *constant diet*, gouty people are liable to

sudden and considerable fluctuations of uric acid excretion. It is important to note that gouty deposits are found almost exclusively in structures belonging to the connective tissue class, and are conspicuously absent from muscle, nerve-tissue, liver, spleen, and lungs. And Roberts (*loc. cit.*, p. 103) shows that the tissues which are liable to uratic deposits are much richer in sodium salts than the tissues and organs which are not thus liable. Hence, on principles already alluded to, sodium urate would be more prone to precipitate in such localities.

(3) *Toxicity of Uric Acid.*—If we believed popular medical, to say nothing of lay, opinion, uric acid is a virulent, all-penetrating poison. Yet it is a normal constituent of our body, and Dr. Watson has proved that, contrary to other assertions, it is regularly found in the blood of birds. Direct experiments upon man and animals do not support the theory of its vicious action, and Sollmann (*Text-book of Pharmacology*, 1901, p. 183), in discussing the physiological action of the caffein group, states that "uric acid shows itself absolutely inactive," save for some local irritation; whereas large doses of kreatin and kreatinin cause headache, nervousness, and slowing of the heart. Sir W. Roberts also entirely disbelieves in the poisonous action of uric acid, a physiological homologue of urea, which is certainly not poisonous.

I have already alluded to leukæmia, in which disease as much as 5 grm. of uric acid may be excreted per day, and Dr. Gore has rightly pointed out that uric acid can be no exception to the general law, that a substance acts as a poison in direct proportion to the amount of it present in the circulating fluids.

(4) *Pathological Histology of Uric Acid.*—Dr. Watson has carefully investigated the histological appearances of gout in the lower animals and in man. He points out that the appearances observed in the tissues warrant the statement that we have no right to assign ætiological significance

to uric acid than to other substances of an unknown nature found in the structureless material left after removal of the crystals. The erosion of cartilage was due, not to the presence of uric acid, but to the phagocytic action of small round cells of the granulation-tissue type. He considers that the pathological portrait is strikingly similar to that seen in chronic infective diseases. Uric acid is merely the feature which gives gouty inflammation its specific character. It is highly interesting to remember that Roberts (*loc. cit.*, p. 105) has demonstrated that a counterfeit gouty joint can be produced in the articulation of a dead animal (pig). After a few days the articular ends of the bones were found to be encrusted with a chalky matter which could not be wiped off with a towel or removed with a nail-brush. They presented an exquisite imitation of the plastered appearance of gouty cartilage. Microscopical sections revealed a dense felt of fine needles of sodium urate in the substance of the cartilage, close beneath the synovial surface.

Working on the same lines as Dr. Watson, Dr. Woods Hutchinson has formulated a more rational and comprehensive theory of gout than that which has so long prevailed.

Dr. Hutchinson defines gout as a toxæmia of gastro-intestinal origin, accompanied by the formation of an excess of urates. This excess of urates is due to the breaking down of the leucocytes and fixed cells in the attempt to neutralise the poison; in other words, it is the measure of the resisting power of the tissues. The formation and introduction of the toxins are by no means confined to the gouty; it is only the nature of the resistance of the body to them that gives the character of gout.

The sum of the whole matter, then, amounts to this. Let us plead for a wider and more catholic conception of gout than that popularly accepted; let us cease to focus our mental lens too exclusively upon a single factor; let us frankly

acknowledge our ignorance of the true pathology of gout, and confess, with Roberts and von Noorden, that, in respect of dietetics, when we enjoin our patients to take freely such foods as milk, cream, and cheese, which are almost free from purin bodies, and to be sparing of food which contains an excess of purin bodies (*e.g.*, meats, thymus, pancreas), we embody almost all there is to be said.[a]

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Dr. Little, in discussing the paper, referred to the belief in the uric acid theory of gout which was so firmly fixed in the lay mind.

Dr. Travers Smith said it was hard to reconcile some obscure alimentary toxin as the cause of gout with the hereditary character often shown by the disease, and with the fact that gout in females is rare till after the menopause, though there were the same dietetic errors before as after.

[a] Of vegetables, oatmeal, peas, haricot beans, and lentils contain the largest amounts of purin bodies. White bread, potatoes, rice, cabbage, and onions contain very small quantities. The Purin Bodies of Food Stuffs. Walker Hall. 1903. P. 46.

# NOTES ON A YEAR'S ASYLUM WORK.

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[Read in the Section of Medicine, November 10, 1905.]

The following are a few brief notes with reference to some of the more interesting points which have arisen in the practice of the year ending March 31st, 1905 :—

*Causation.*—On looking over the admissions of the year, it appears that hereditary diathesis played a part in the causation of no less than 66.6 per cent. of the cases, and was judged to be the chief factor in 33.3 per cent. These percentages include a case of alcoholism, not exactly insane, in which there was an inherited tendency to alcoholism only, so far as known. The admissions for the year, therefore, showed a larger proportion of cases with inherited diathesis than those of the previous year, in which it was known to be present only in 50 per cent. of the cases; but, on the other hand, diathesis was judged to be the chief factor in nearly 36 per cent. last year, as against 33.3 this. Mental and physical wear and tear formed the predominant cause in an equal number of cases, 33.3 per cent., but the toxic factor was more prominent than usual, accounting for 33.3 per cent., as against 21.4 per cent. in the previous year. It will thus be seen that the three categories into which the causes of insanity may be roughly divided were each mainly answerable for the same proportion of the admissions, but of course more than one factor was usually present. The toxic agent chiefly at work was alcohol, but one case was the result of influenza, and syphilis played a part in another.

*Forms of Mental Disease.*—The proportion of cases which

might be classed as mania was again large, one-third of the admissions being of this character. Of the remainder, an unusually large proportion were cases of dementia, including two of the so-called dementia præcox, and the balance consisted of cases of *folie circulaire*, melancholia, and alcoholism. Half the cases of mania recovered rapidly during the year. An alcoholic patient, who came as a voluntary boarder, was not insane in the ordinary sense of the term.

One of the cases of *mania* illustrates the tendency to recurrence in adolescent insanity. It is that of a young girl who had been treated in the previous year for the same form of disease, and had been discharged recovered in two months. She was admitted again just eleven months after the previous admission, but on this occasion was not discharged for five months. Cases such as this require very judicious treatment until adolescence is complete, the tendency to the establishment of recurrent insanity, and finally dementia, being very great. From the increased duration of the second attack, one is inclined to fear that another breakdown might prove permanent. A case of senile mania was the only instance of disease due to old age, and even in this influenza was the exciting cause.

*Dementia Præcox.*—The controversy which still rages about this alleged morbid entity is by no means settled, but there seems to be a general opinion in these countries that the name at least is a bad one, as implying a very doubtful hypothesis. Be this as it may, however, it must be said that cases conforming more or less to the descriptions of the disease, if such it be, do occur not so very infrequently in practice, and therefore until some better term is devised it is convenient to use the existing one. Three cases of this class were under treatment during the year, and in view of the present interest in the subject it may be worth while to study them more in detail.

Case I.—Married woman, aged thirty-two; very bad heredity. She seems to have been always somewhat childish for her age, and was very untruthful, but her physical health was good. Five years before, after some monetary worries, she had an attack of mental disease which was diagnosticated as delusional insanity, the delusions taking the form of suspicions of poisoning, doubts of the identity of her relatives, and others. For this she was treated in an English asylum for about four months, during part of which time she was excited, violent and dangerous. She was ultimately discharged relieved, contrary to advice, and since then seems to have been a perfect thorn in the side of her relatives. She was sufficiently acute to avoid being certified, but was silly in other respects, had no work or interests, drank at times, and had occasional attacks of hysterical excitement. She was finally persuaded to come to Farnham House as a voluntary boarder. On admission she looked worn, neurotic, and out of health, but except for slight cardiac weakness her organs were sound. Her mental state was one of permanent dementia; her ideas on general subjects were infantile—*e.g.*, she thought that Rhodesia and China were close together; she showed total inability to grasp the simplest game, never read or occupied herself, lied freely on the smallest provocation, and was generally sly and untrustworthy. From time to time, about once or twice a month at first, she had hysterical attacks, in which she was noisy and violent for fifteen to thirty minutes, but these soon began to diminish in frequency, and towards the end of the year had practically ceased. Otherwise she cannot be said to have improved mentally, but her bodily health has shown the most marked change for the better under the tonic and dietetic treatment to which she has been subjected.

In this case we have the bad heredity showing its influence by certain mental stigmata; an attack of apparent paranoia in later adolescence, in which, however, the delusions proved temporary; and finally a state of dementia in which perception is well maintained, while interest in surroundings and the power of judgment are largely lost; together with occasional attacks of excitement. There can be little doubt, therefore, that Kraepelin would class this as an instance of the paranoid

form of dementia præcox. The outlook is of course bad, the utmost that can be expected being a maintenance of the present state.

The second case was partly described in the notes for last year (Case III.), but may be briefly recapitulated :—

Case II. — Student, aged twenty-one; some neuropathic heredity. He broke down from overwork for an important examination about two years before, and five or six months previous to admission he began to suffer from hysterical attacks, and complained of mental dulness, which, indeed, seems to have persisted from the time of the first break-down. During about six weeks before admission he had three short maniacal seizures. He came as a voluntary boarder, and at first seemed to benefit, his bodily health being particularly good; but after about a month he suddenly became very depressed, with high blood-pressure and lessened sensibility to pain. This was treated by the bed method, but he then developed a hallucination and delusions, including the idea that he was dead. When obliged to walk he showed attitudes, and there was a good deal of stupor varied with hysterical ecstasy. After a few days, however, he suddenly became acutely maniacal and violent, with delusions, sleeplessness, and refusal of food, and had to be certified. He was treated mainly with the wet-pack, and the excitement passed off after eight days, leaving him thin and weak. He soon recovered strength, however, and mentally showed great improvement, so much so that he was allowed to leave on probation in a month. At first he did not do so well outside, but on going to stay with some friends to whom he was attached he at once began to improve, and after two months was discharged absolutely. So long as he remained with these friends he continued to improve, the chief sign that he was not quite well being a tendency to wander off for a night. These escapades, however, became less and less frequent; he began to do some mental work again, showing unimpaired intellectual capacity; and all appeared to be going so well that his relations brought him back home and proposed to send him abroad. He had one or two more wandering escapades owing to the worry so caused, and when abroad made two attempts at suicide, one of which was nearly successful, so that on his return home he was sent to an asylum.

The symptoms of this case, as well as its ætiology and general features, leave little doubt that it also is one of dementia præcox, but the termination might have been very different to that of the last had the relatives shown a little more patience and allowed a year or so longer to elapse before removing him from the congenial surroundings where he was doing well. Even yet one would hesitate to say that the case is hopeless.

In the third and last case the result has been still more favourable.

Case III.—Lad of eighteen, with slight neuropathic heredity, but showing stigmata of degeneracy in the form of congenital left-sided ptosis and a high, deformed palate. He looked overgrown, poorly-developed, and young for his age. Five days after having some teeth extracted under ether he began to complain of being stared at, and on the following days was excited, chattering incoherently, repeating words meaninglessly, and refusing solid food. After a week he was sent to Farnham House, and then had a slightly raised temperature, and was somewhat exalted, facile and cheerful, but abstracted and silent unless spoken to. He walked with a peculiar stiff pacing gait, hands hanging, head drooped forwards, but from the beginning could be got to play cricket. In fact he did anything he was told, sometimes with an exaggerated alacrity, though when not directed to do things he usually remained apparently absorbed in contemplation. During the earlier months of his treatment he manifested various delusions, such as that a wasp or moth was in his room and would kill him, that he was to be fired out of a cannon, and soforth, and also hallucinations, auditory (inarticulate sounds and voices), visual (insects), and of smell (bad odour from his person). He was put on tonic treatment, fed up, and made to take such exercise as his strength allowed in the form of walking, wood-cutting, cricket, hockey, &c., and in about three months some improvement was manifest, which from that time progressed without interruption, until finally he was discharged perfectly well in less than six months, a cheery, pleasant, active lad, in good bodily health, and eight pounds heavier than on admission. It may be noted that his blood-pressure, which was

high on admission, dropped before his discharge. All subsequent accounts of him have been favourable.

This case has been dealt with at some length with a view of showing that it was undoubtedly one of dementia præcox of the hebephrenic form, most of the classical features being present. Yet this patient made an excellent recovery, notwithstanding the statements of some authorities that such cases never get well. From it, therefore, and to some extent from the preceding case, we are entitled to conclude that the prognosis in dementia præcox is by no means so hopeless as has been supposed

*Alternating Insanity.*—In previous years stress has frequently been laid on the fact that the recurrent forms of insanity are most frequently, if not invariably, found in persons with a hereditary neuropathic diathesis. Of no form is this held to be more true than of the rather uncommon alternating insanity or *folie circulaire*, two cases of which were admitted during the year: yet in one of these at least the evidence of heredity is wanting.

Case IV.—A well-to-do man of business, aged fifty-three, free from hereditary taint, so far as known. That there was probably some neuropathic tendency, however, was shown by the fact that one of his children is paralysed in both legs, and was formerly addicted to alcohol. The patient himself seems to have been what is commonly known as "wild" in his youth, and was given to moods. When he was about thirty-eight the first pronounced attack of mental depression occurred, lasting about three months, and was followed by a period of high spirits, which then passed off. Since that date the succession of depression and exaltation has occurred about once every two years, and the attacks have been increasing in violence. In one of his maniacal periods he became violent and dangerous, and was sent to an asylum in 1899, where he had recovered by the end of 1902, and remained well up to the summer of the following year. His wife then became ill, and as a result he was seized with an attack of depression which has persisted ever since, being the longest

which he has yet had. His melancholia, as usual in alternating insanity, is not very acute. It is hypochondriacal in form, as it has been throughout; and though a very healthy man, with an excellent appetite and digestion and able to play outdoor games and take other exercise, he maintains that he is seriously unwell and very weak.

Regarding the antecedents of the second case no facts are forthcoming.

Case V.—It is that of an old lady, aged over seventy, who was for many years an inmate of a small private institution, now broken up, previous to which she was in various other asylums. The original cause of her insanity is said to have been alcohol, and it is stated that she had a large number of distinct attacks, the last before that for which she was admitted having taken place about six months previously, and lasted about three months. Between the attacks she seems to have been mildly demented. She was rather excited on admission, and complained of hearing voices, which said annoying things to her, and kept her awake at night. She was very talkative and incoherent, and remained in the same condition for about two months, when she improved and became comparatively sane. Since then she has had two attacks, and, though not so well-defined as those in the last case, they consist of a short period of hilarity followed by a longer one of depression, which gradually passes into the state of slight mental weakness which is the nearest to normal for her. The auditory hallucinations are never absent, but when at her best she does not mind them much, and is almost persuaded that they are not real.

In this case it will be seen that the order of the periods is the reverse of that in the previous one. In both the prognosis is, of course, bad as to complete recovery.

*Physical Disorders and Symptoms.*—A subject of the irritable type of mania, admitted during the year, was found to be suffering from mitral incompetence, and two other patients admitted (one of dementia præcox, the other of melancholia) had weak hearts without actual disease. Another case of dementia præcox had a quick pulse *with* high arterial pressure. The *arterial pressure* was taken in eight

new cases, in two of which (simple acute mania and chronic alcoholism respectively) it was found to be normal. In two others it was low, and these, strange to say, were both depressed, being thus exceptions to the almost invariable rule that blood-pressure is high in melancholia. No circumstance explaining this anomaly was to be found in one case, but in the second the heart was very weak and the patient debilitated, this, no doubt, being the cause of the low pressure. The remaining four cases (two of dementia præcox and two of mania) showed high pressure, and thus two were apparent exceptions to the rule. It has been found, however, that low pressure is less commonly found in mania than high in melancholia, and, as a matter of fact, it appears to depend on the precise form which the mania assumes. Both of these were examples of angry mania, which delusions of an unpleasant cast rendering the patients somewhat unhappy, and were not instances of the cheerful, hilarious variety, where in all probability the pressure will be found to be low almost always.

A chronic alcoholic suffered on admission from the usual dyspepsia, which speedily yielded to treatment.

A number of cases had transitory *albuminuria* on a single occasion, generally slight. No particular conclusion could be drawn from the mental character of these cases, but about half were more or less depressed. Albumen in large amount was present for a long time in the urine of an old paranoiac, who died early in the year, and a small quantity was habitually found in that of a senile melancholiac who had long suffered from chronic nephritis. It was also met with twice in a case of mild dementia due to alcohol and syphilis. This patient was not depressed.

*Glycosuria*, often slight, was found in twelve cases, usually only once or twice, during the year, but one case of minor epilepsy showed it practically continuously. Some of these cases had had the symptom on previous occasions. The

general character of the mental symptoms was in accordance with previous observations, and showed that glycosuria most commonly occurs in conditions of depression or dementia. Beyond this it appears to have no particular significance when present merely as a transient phenomenon.

The following case offers some points of interest on the physical side :—

Case VI.—Male voluntary boarder, aged thirty-one, single; neuropathic heredity probable, but not ascertained. The patient was always very eccentric and lived a wild life, drinking heavily, more than once to the verge of delirium tremens. He also contracted syphilis about ten years before admission. Four years later a series of seizures commenced, in each of which he was unconscious at the time, and more or less paralysed afterwards, recovering gradually. He continued to drink, and finally, four years before admission, he had an attack in which he was unconscious for days, since when he has been partially paralysed and somewhat weak-minded, seems to have been somewhat erotic, and was given to fits of rage at times. For some weeks previous to admission he was treated with iodide of potassium in a general hospital, and is said to have improved somewhat. While there the muscles of his back and legs were found to be weak, with ankle clonus and the Babinski reflex, but those of the arms were fairly strong. On admission he was found to be facile and good-humoured, with a fair memory and intelligence, and free from delusion or other gross abnormality. He was, however, given to boasting and "drawing the long bow," but not to an insane degree, and it may be said once for all that, although some mental weakness existed, he was not considered to be certifiable. His face was rather immobile and his lips weak, as also the muscles of deglutition. The legs were weak and the muscles somewhat atrophied, but not excessively so, and with help he was able to walk slowly. All his movements were slow, and he could not button his clothes; but there were no intention tremors. and he could write and pick up a pin. Speech slow and monotonous, but not syllabic or slurring. Knee reflexes exaggerated ankle clonus present. Eyes normal, except that the right pupil was a trifle the larger. The sphincters sometimes failed to act,

and nocturnal emissions were troublesome at times. He was treated with lecithin for some time without result, later with strychnin and quinine, and finally with potassium iodide. None of these drugs produced any marked effect, but the net result was considerable general improvement when he was discharged after some five and a half months' residence. It should have been mentioned that he had been ineffectually treated, at various times before coming here, by massage and electricity.

There are so many points in this case inviting discussion that too much space would be occupied in dealing with them; but a few words may be said on the diagnosis. One naturally thinks of general paralysis, and in view of the great variability of the symptoms in that disease, it cannot be absolutely excluded. Still the slight degree of dementia, the non-progressive character of the paresis and its partial distribution, the absence of signs almost universally found in general paralysis, such as certain ocular phenomena, speech-slurring and the like, and the persistence of the sexual nisus at so late a period of the disease, render this diagnosis in the highest degree improbable. One must suppose that a degenerative process with a more localised distribution, and practically non-progressive, had been set up by the alcohol in a brain weakened by syphilis, and that secondary degenerative changes then took place downwards along the spinal cord.

*Treatment.*—Hydropathic treatment in the form of the *wet-pack* proved very useful in an exceedingly acute maniacal attack occurring in the course of dementia præcox (Case II.), cutting short the attack in a few days. It was also frequently used in a more prolonged case of mania with numerous fits of restlessness and violence, though in this case the results were not so conspicuous.

A short course of general *massage* was tried in a case of agitated melancholia, combined with a good deal of stupor, but did not prove sufficiently effective to justify continuance.

The same patient was subjected to *thyroid treatment* later in the year, but proved so susceptible to the drug that it had to be stopped after only 175 gr. had been given, owing to symptoms of collapse and an attack of asthma. The patient is said to have been subject to the latter, but is the only instance in which this symptom has occurred in this institution as an effect of thyroid. The treatment produced no immediate improvement, but about four months later a change for the better set in, the patient being nearer to mental recovery than at any time since her admission. It is very questionable, however, if the thyroid treatment can have had anything to do with this.

A case of chronic alcoholism of some seventeen years' standing underwent a course of *atropin treatment*, at first with excellent results.

Case VII.—Man of forty-nine, with alcoholic heredity. He had drunk to excess for about seventeen years, with occasional intervals of some months. Before admission he was taking six to eight glasses of whisky in the day, but does not seem to have been made actually drunk by it. He had been living on milk only for some weeks, with a little soup, owing to want of appetite and morning sickness. There was some general tremor, and toxic amblyopia was present, but beyond this the bodily condition was fair. Treatment by means of strychnin and atropin injection was started at once, beginning with $\frac{1}{60}$ gr. of the former and $\frac{1}{200}$ of the latter thrice daily, and rising gradually to $\frac{1}{15}$ and $\frac{1}{50}$ gr. respectively. The atropin was stopped after twenty-three days, but the strychnin injections were continued for thirty-eight days longer. A mixture containing extract of cinchona and compound tincture of gentian was given at the same time, a little cascara being subsequently added. A small quantity of whisky was allowed for the first three weeks, and the patient was carefully dieted. On the third day of treatment he began to suffer from hallucinations of a vivid description, mainly visual, but also auditory, and—in one instance—of touch, the nature of which, however, he recognised. The atropin was discontinued for a couple of days, and large doses

of morphin were given, with the result that the hallucinations soon passed off, and did not return again. The patient's general health, as well as his mental powers, improved rapidly, and he was soon able to take ordinary diet. Any craving for stimulants likewise disappeared (although there was no actual distaste such as has been described); and notwithstanding that he could have obtained stimulants, being allowed to go into Dublin, there had been no relapse up to the end of the year, over four months from the commencement of the treatment.

On the whole this case was so far satisfactory that the alcohol was discontinued and the craving broken without any great discomfort. The hallucinations evidently signified an attack of delirium tremens due to the action of atropin superadded to the alcohol, but it was fortunately possible to abort it.

*Hypnotic suggestion* was tried, at first with some success, in the following case :—

Case VIII.—Man, aged forty-eight, with neuropathic heredity, who was admitted as a voluntary boarder suffering from mild mental depression, the result of insomnia due to overwork and worry in an onerous and responsible post. The insomnia was of about a year's standing, but had been cured for a time by a sea voyage. He soon relapsed, however, and found himself unfit for his work, easily tired and depressed. His general bodily health was good and his organs were sound. On going to bed he would drop off to sleep, but always awoke about 3 a.m., and did not sleep again, frequently owing to an attack of flatulence. Under ordinary treatment with sedatives and carminatives he got sufficient sleep and improved greatly in health and spirits. As, however, his sleep was still not so good as to guarantee continuance, it was thought advisable after five weeks to try hypnotism. He proved an easy subject, and was hypnotised six times and told that he would sleep until after 6 a.m., which he did. He then went to England for a change, and remained well for three weeks, but on his return to Dublin lost his sleep again. Henceforth, though still easily hypnotised, he seemed to have largely lost his susceptibility to suggestion so far as sleep was concerned, as

he could not be got to sleep after 4 a.m. Hypnotic suggestion combined with friction to the abdomen during hypnosis, however, invariably relieved his flatulence and abdominal discomfort. Some degree of depression returned, but had passed off during the last few days of his residence, the blood-pressure, which was 130 mm. on re-admission, falling to 115 mm. He was finally discharged after about six weeks, and advised to go back to his work.

In this case the failure of suggestion when tried after the relapse may have been partly due to the fact that on the second night, after being hypnotised, he was kept awake owing to the illness of his wife. (Hypnosis was tried while he was staying in Dublin, in order to avoid, if possible, a return here.) He had slept well after being hypnotised on the previous night, but this break in the effects of suggestion seemed to impair his faith in its efficacy, and hence to lead to failure.

A case of minor epilepsy, described in last year's notes (Case VIII.), who at that time had been for over three months kept free from attacks by a mixture containing potassium bromide combined with digitalis, continued perfectly well, and was discharged just before Christmas. All accounts of him up to the end of the year were favourable, but he was still taking the mixture, though in reduced strength.

*Cerebrin* (Poehl) tried in another case of epilepsy, in which it had done well before, seemed to have lost its effect, and the combination of digitalis and bromide also failed to yield any conspicuous results.

*Lecithin* also was ineffective in one or two cases of a degenerative character in which it was tried.

# A CASE OF ACUTE GRAVES'S DISEASE, WITH FATAL TERMINATION.

By JOHN AGAR MATSON, M.D. Univ. Dubl., F.R.C.P.I.;
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[Read in the Section of Medicine, December 8, 1905.]

Cases of Graves's disease ending fatally so soon after their onset are rare. For the year 1904, except in St. Thomas's and St. Bartholomew's Reports, I could find no case recorded in the journals or in those hospital reports to which I had access. Severe vomiting seems to be the one symptom common to fatal cases; therefore its onset in any case should prepare one for a bad prognosis. Quinsy or sore throat has been noted as the starting point of many of these acute cases, so it is probable that all the glandular organs of the throat may be provoked by the superactivity of the thyroid gland.

In the case I am about to describe the whole duration of the attack, from the time when the patient first complained of illness in the convent till her death in the hospital, comes to 19 days.

M. A. H., aged twenty, laundry-maid in Stanhope Street Convent, Dublin, was sent into the Hardwicke Hospital on the 29th of April, 1905, suffering from sore throat and difficulty in breathing.

*History of Illness.*—On the 19th of April she complained of sore throat, and was seen by the doctor of the institution, who ordered her to bed. After a few days she got so much better she was allowed up, but in a day or two she was noticed to be very despondent and emotional. The doctor then sent her into the Hardwicke.

*Family History.*—None obtainable.

*Previous Medical History.*—For 10 years she had been an inmate of the institution, and, though looking fragile and delicate, was

never actually ill until this attack. She was always obedient, and never showed any neurotic tendencies. The enlargement of the thyroid was noticed only the day before her admission to hospital.

*Examination.*—Patient is of medium height, thin and anæmic. She looks much younger than her age, being more like a girl of fifteen than one of twenty, the mammæ being very small. She was heavy and drowsy, though easily aroused. Temperature, 99° F.; pulse, 140; respiration, 44, noisy, showing some laryngeal obstruction. Both the tonsils and pharynx were covered by a very viscid, thick, creamy white secretion, on removal of which the parts were found to be very red and inflamed. There was not much difficulty in swallowing. The swab taken from her throat proved negative. The thyroid was enlarged, both lobes equally, and pressing on the trachea, causing stridorous breathing. Slight pulsation in it, but no bruit was heard.

*Lungs.*—Some scattered rhonchi to be heard.

*Heart.*—Apex beat in the 5th space internal to nipple line. No bruit. Heart's action forcible and rapid, and pulsations can be felt in abdominal aorta and in the carotids; the 1st sound prolonged in mitral area.

*Pulse*, 144 at the wrist, regular but feeble. During the course of the disease the count was taken from the apex beat; it ranged from 150 to 170.

*Urine*, 1030, normal.

*Bowels*, confined.

*Eye Symptoms*, absent.

*Tremor*, very badly marked.

*Progress.*—Very severe vomiting, which began the day after admission, continued till the 5th of May, in spite of all treatment. At first the vomit consisted of whatever food was given, and occurred only after meals; later on, it was independent of nourishment, and was of a glairy mucoid description. There was a sweet, alcoholic smell off her breath; this may have been due to some spirits of chloroform in her medicine, though it persisted for some days after the medicine was changed, so was probably due to acetone. Her mental condition got worse, and she became very restless, wanting to get up, tossing the bed-clothes off, and talking to herself. One could always rouse her, and she would answer fairly coherently, though she said she was always better, even when an attack of the vomiting was on her. On May 4th von

Graefe's and Stellwag's eye signs were noticed, though not well marked. The pulsation in the thyroid became more visible, and a bruit, systolic in time, was audible. Her skin was fairly moist, but there was never any sweating. There were no disturbances of the skin. On the 5th the vomiting stopped, and she could retain food by the mouth, otherwise no change. Exhaustion set in on the 6th, and she died on the 7th. The temperature ranged from 99° F. on admission to 100° F. on the 5th of May, and rose on the night of the 6th to 103° F., falling to 100° F. next morning, and rising to 101° F. just before death.

*Treatment.*—T. strophanthus, digitalin $\frac{1}{100}$ gr., with strychnin $\frac{1}{80}$ gr. hypodermically. T. digitalis, anti-thyroidin hypodermically, ʒ ii in 10 ♏ doses every 3 hours. None of these had any effect on the pulse. Bismuth mixture and nutrient enemata. Ice bag over the præcordia served to give ease on a couple of occasions by calming the forcible cardiac action.

*Post-mortem Examination.*—Body much emaciated. Thyroid much enlarged; weight, 215 grammes. Both lobes were equal in size. The isthmus was large, and closely embraced the trachea. Thymus gland persistent, not very large. Heart small, normal; aorta, very small. Lungs: right, normal; left, small cavity in apex. Spleen, normal, adherent to diaphragm. Kidneys: right, normal; left, elongated, otherwise normal. Liver, somewhat fatty. Uterus and ovaries, infantile.

Brain not examined, nor the spinal cord.

Dr. F. C. Purser made sections of the thyroid gland, and reports there was an increase of fluid and dilatation of the spaces, and the fluid was much thinner than normal.

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Dr. Finny, in discussing the case, said he found that in ordinary cases of Graves's disease absolute rest, removal of all exciting causes, and electricity gave the best results.

Dr. Moorhead said he was at present observing a similar case, which began three weeks ago with typical diphtheria. The thyroid was not then enlarged, but since then had been increasing in size noticeably from day to day. He stated that he found hypodermics of morphin the most satisfactory treatment.

# A CASE OF HEMIPLEGIA IN A CHILD.

By R. TRAVERS SMITH, M.D., F.R.C.P.I.;
Visiting Physician to the House of Industry Hospitals, Dublin.

[Read in the Section of Medicine, December 8, 1905.]

M. S., a girl, aged seven years, was admitted to the Whitworth Hospital on October 25, 1905, by Dr. Purser, under whose care she remained for a few days during my absence. Her mother stated that the child had always been healthy, with the exception of an attack of bronchitis a few months previously. On the morning of admission to hospital the child was found to be unable to dress herself owing to loss of power of her right arm and leg. Her mother was positive that this condition was not present the day before—in fact, that the child was in her usual good health. When put to bed in hospital the following points were observed in the case:—

The child was well-nourished and looked healthy. Temperature, 100.8 F.; pulse, 110; respirations, 26. The right leg exhibited almost total loss of voluntary movement. The right arm was completely paralyzed, as were also the lower half of the right side of the face, and the right side of the tongue. There was no disturbance whatever in voluntary motion of the left side of the body. The eyes were normal. As the little patient was bright and intelligent, and manifested no symptoms of "shock," it was easy to test sensation, which was found undisturbed over the body. No pain was complained of. Speech was only affected slightly by the paralysis of the right side of the tongue; aphasia of any detectable form was absent. The muscles of the paralyzed right leg and arm were absolutely flaccid. Cutaneous and tendon reflexes were completely lost in the right leg. They were also lost in the left leg, with the exception of the knee-jerk, which was greatly diminished. Babinski's sign was absent on both sides. Careful examination of the internal organs, especially of the heart, revealed nothing abnormal. The urine was normal. Examination of the blood for Widal's reaction gave a negative result.

On first seeing the case the points upon which I was obliged to base a diagnosis, therefore, were as follow:- - A previously healthy child suddenly developed hemiplegia of the right side of the body, including tongue and face. Its onset was apparently unaccompanied by shock, unconsciousness, or convulsions. The affected muscles were flaccid, and showed loss of tendon and cutaneous reflex action. Sensation unaffected.

In attempting to locate the lesion, the conclusion that it was situated somewhere in the motor tract between the left Rolandic area of the cortex and the lower border of the pons on the same side was irresistible, despite the fact that the flaccidity and lost reflex action of the affected muscles rather indicated right-sided nuclear or peripheral nerve disturbance. The nature of the lesion was much more difficult to define with certainty. The sudden onset of the hemiplegia indicated some vascular accident. For thrombosis or embolism no cause could be found. Cerebral hæmorrhage of the ordinary variety could not be excluded with the same degree of certainty, for I had twice had the opportunity of verifying this diagnosis *post mortem* in quite young people without apparent cause. Yet probability was against a vascular lesion. An acute cortical encephalitis affecting the left Rolandic area, analogous to acute cornual myelitis, has been suggested by Strumpell as a possible explanation of sudden infantile hemiplegia, and the possibility of such was entertained. That an old-standing, latent cerebral abscess can suddenly produce hemiplegia I have personally observed on several occasions, but any cause for such was absent in this particular case. All circumstances considered, the diagnosis of cerebral tumour of some variety appeared to offer least resistance—the sudden onset of the hemiplegia being accounted for by hæmorrhage into the growth, as is prone

to happen, or arterial or venous thrombosis in its immediate neighbourhood.

With the exception that the facial paralysis improved, no change occurred in the patient's hemiplegic signs, or otherwise, for a week. Her temperature then went a few degrees higher, whilst her pulse became slower (about 60 to 70 per minute), respirations remained approximately as on admission. She became dull, no longer evincing interest in her surroundings By the end of the second week she had become comatose; the pupils dilated and irresponsive to light; she was unable to swallow; the sphincters of the bladder and rectum relaxed: the temperature fell to sub-normal; the respiration became slower and irregular; the pulse also slower, but subject to variations. Rigidity of the muscles did not develop except slightly in those of the neck. All the above symptoms being recognised as those of distended cerebral ventricles, and holding the opinion that when this condition is recognised it should not be allowed to constitute the immediate cause of death (any more than distended pleural cavities should be allowed to do so without being relieved), I performed lumbar puncture. In doing so there is always the hope, at least, in an obscure cerebral case that the ventricular distension may be due to some transient or not necessarily fatal cause—*e.g.*, mild cerebro-spinal meningitis or sinus thrombosis, &c.

In this particular case the lumbar puncture was warranted by the direct evidence of ventricular distension as shown by the fact that the cerebro-spinal fluid flowed forth in a continuous stream, made more rapid by pressure upon the head, also by the fact that improvement followed the puncture in that the patient became slightly more conscious, the pulse became quicker, the pupils more sensitive to light. A test-tube and a half of fluid was allowed to escape. The fluid was as clear as crystal. No micro-organisms could be cultivated from it, and it contained so very few cells that no deductions could be drawn from its cytology, except, perhaps, that in these

negative ways it tended to exclude an acute meningitis. As the day previous (the 15th day) to that on which puncture was performed, however, paralysis of the external rectus of the right eye had developed, an acute meningitis had been definitely diagnosticated, the improvement following lumbar puncture was but transient. Coma deepened again, the pulse became very rapid, probably due to vagus paralysis, Cheyne-Stokes respiration appeared, the right pupil became more dilated than the left, and intermittent spasm of the right upper eyelid occurred. The child died on the fifteenth day of her illness.

*Post-mortem.*—On removing the dura mater it was found to be thickened and adherent to the cortex for an area an inch and a half in diameter, corresponding to the centre of the left Rolandic area. In the centre of this patch there was a small cortico-meningeal abscess about the size of a pea. Around the patch were a few small, scattered masses of tubercle. It was evident that these appearances were due to an old tubercular focal lesion. For the rest the subarachnoid space contained an abnormal amount of clear fluid. Miliary tubercles were found at the base and over the superior surface of the cerebellum. The ventricles were distended, and contained clear fluid.

The points which interested me in the case were the following:—

(1.) *The Diagnosis.*—Cases of hemiplegia in children offer notorious difficulties in the diagnosis of their cause. In many of the cases which do not end fatally the diagnosis can never be made with accuracy. Though not usually recognised as an important causative factor in the hemiplegia of childhood, such a chronic cortico-meningeal tubercular focus, as in this case, *may* play a considerable part in causing permanent hemiplegia. In fact, there is no objection to supposing that in other cases similar focal tubercular lesions might subside, and never cause fatal

miliary meningeal tubercle as in this case, yet still produce permanent hemiplegia.

(2.) *Paralysis of the face and tongue* is very rare in the hemiplegia of childhood. Had it not been present in this case, and had the leg and arm only been affected, the flaccid condition and lost reflexes of their muscles would have, in the earlier part of the child's illness, strongly suggested a unilateral, acute anterior poliomyelitis.

(3.) *The flaccidity and lost reflexes* in the paralyzed muscles with a lesion of the cortex (even before general meningitis had supervened).

(4.) *The sudden onset.*—This case and others I have observed show me that the general rule, that a sudden onset of paralysis indicates a vascular lesion, is not without its exceptions.

(5.) The involvement of the leg, arm, and face, unaccompanied by unconsciousness, convulsions, or "shock," was more suggestive of a lesion in the region of the internal capsule than in that of the cortex.

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Drs. Kirkpatrick, Langford Symes, and Bewley, in discussing the case, all spoke of the peculiar condition of the limbs. Dr. Bewley also asked whether it were possible that an embolus had lodged in the middle cerebral artery.

Dr. Travers Smith said there was no embolus, and referred to the absence of reflexes commonly met with in general meningitis as an explanation of the condition of the limbs.

# THE STOKES-ADAMS SYNDROME.

By ALFRED R. PARSONS, M.D., F.R.C.P.I.;
Physician to the Royal City of Dublin Hospital and to the Royal National Hospital for Consumption.

[Read in the Section of Medicine, December 8, 1905.]

ALMOST eighty years have elapsed since Robert Adams published an article entitled "Cases of Diseases of the Heart, accompanied with Pathological Observations."[1] Among these cases is one which he saw in the year 1819 in consultation with Mr. Duggan, who was the ordinary medical attendant. The patient was a revenue officer, sixty-eight years of age, who had been for a long time incapable of any exertion, as he was subject to oppression of his breathing and cough. Mr. Duggan had attended this patient for seven years, and during this period he had seen him in not less than twenty apoplectic attacks. Each attack was preceded by heaviness and lethargy. During the attack, which was always sudden in onset, the patient was completely unconscious, the pulse was very slow, and the breathing stertorous. The attacks were never followed by any paralysis. Adams saw the patient a few days after one of these attacks, and he was impressed chiefly by the irregularity of the breathing and the remarkable slowness of the pulse, which generally ranged at the rate of 30 in a minute. Some six months later the patient was seized with another of these apoplectic attacks, which terminated fatally in two hours. The autopsy disclosed no evidence of any cerebral hæmorrhage of either recent or remote occurrence. "The coats of the carotid and middle arteries of the dura mater were quite white and opaque from bony deposition, but were

pervious." In the heart the right auricle was much dilated. The right ventricle appeared to be almost entirely composed of fat. The left ventricle was very thin, and its whole surface was covered with a layer of fat. Beneath this the muscular substance was not a line in thickness; it had degenerated from its natural state, was soft, and easily torn. The whole organ was remarkably light; the valves were all sound, except those of the aorta, which were studded with specks of bone, but elsewhere were cartilaginous and elastic. In commenting on this case Adams suggested that the apoplectic attacks were due to cerebral congestion owing to the failing ventricles and the rigid aortic valves, and that the venous blood was responsible for the lethargy and heaviness from which the patient suffered.

In an article published in the *Dublin Quarterly Journal of Medical Science*,[2] by Dr. William Stokes, entitled "Observations on some Cases of Permanently Slow Pulse," the author refers to Adams' case, and observes that the attention of subsequent writers on diseases of the heart has not been sufficiently directed to it as an example of a very curious and special combination of symptoms. He publishes a case in which the patient had repeated pseudo-apoplectic attacks (which were not followed by paralysis), a slow pulse, and a valvular murmur. This patient was sixty-eight years of age, and was admitted to the Meath Hospital on 9th February, 1846. He stated that for three years he had been liable to fainting fits, of which he had at least fifty. The fits were very uncertain as to the period of their invasion, and irregular in their intensity. Their duration was seldom more than four or five minutes. They were induced by anything which impeded the heart's action, such as sudden exertion, distended stomach, or constipated bowels. The only warning of the onset of attack

was the feeling of a lump in the stomach, which passed up the right side of the neck into the head, where it seemed to explode and pass away with a loud noise resembling thunder, by which he was stupefied. He was never convulsed or frothed at the mouth, and the attack was never followed by any paralysis. At first he found that spirits was the best restorative or prophylactic, but latterly he has not used them, being "afraid to die with spirits in his belly."

On examination, in addition to some bronchial catarrh, it was noticed that the impulse of the heart was extremely slow, and of a dull, prolonged, heaving character. The first sound was accompanied by a *bruit de soufflet*, best heard along the sternum and into the carotid arteries. The second sound was at times impure. The pulse was 28 to the minute, the arteries visibly pulsated all over the body. They appeared to be in a state of permanent distension, the temporal arteries ramifying under the scalp just as they are seen in a well-injected specimen. While in hospital he had no attack, but if he had a warning he turned on his hands and knees, and kept his head low. Thus he believed he was able to avert one.

On the 4th of March Stokes noted that on listening attentively to the heart's action he perceived there were occasional semi-beats between the regular contractions—very weak and unattended with impulse. The patient left the hospital in March, but returned again in June. The cardiac phenomena were the same as before, but there was a remarkable pulsation in the right jugular vein—the pulsation being more than double the manifest ventricular contractions.

Stokes refers also to another case presenting the combination of a pulse under 30, repeated pseudo-apoplectic attacks not followed by paralysis, and a valvular murmur

with the first sound. This patient was advanced in life, but enjoyed general good health. He expresses his approval of the opinion of Dr. Law that the pseudo-apoplectic attacks in cases of slow pulse and weakened left ventricle are more frequently attributable to a diminished or feeble circulation than to one of active congestion.

The youngest patient who presented this triad of symptoms mentioned in Stokes' article was a case in Sir Patrick Dun's Hospital under Law. This patient was only forty-four years of age. The pseudo-apoplectic attacks occurred three years previously, and increased in frequency to such an extent that he had ten or twelve attacks in twenty-four hours. His pulse was only 30 per minute, his heart action very weak, and the sounds scarcely audible.

Professor Osler, in his "Lectures on Angina Pectoris and Allied States,"[3] devotes several pages to the account of the Stokes-Adams syndrome, as recent Anglo-American writers had not dwelt specially on this symptom group. Typical cases, he says, are not common, and the best instance recorded in America is by Prentiss, of Washington. Prentiss' case was a man, fifty-three years of age, with advanced arterio-sclerosis, and a pulse which for two years ranged from 11 to 40 per minute. He had several fainting attacks and sensations of tightness across his chest. At the autopsy the heart was enlarged, but neither the aorta nor the coronary arteries were atheromatous. Apparently the nearest approach to a fully-developed example of this syndrome, which Osler had under his own care, was a patient who, in addition to the vertigo and slow pulse, had a sense of severe oppression in the chest, which suggested the possibility of an oncoming angina. This patient was a man aged forty-six years. He had at intervals severe vertigo, but had never lost consciousness. His impulse

was 34 per minute, and examination of the heart revealed nothing abnormal except a systolic murmur over the base.

The *British Medical Journal* for 21st October, 1905, contains a most instructive article by Hay on the Pathology of Bradycardia. His patient was only twenty-six years of age, and he complained of breathlessness on exertion and attacks of unconsciousness. In this case Dr. Hay noticed that the pulse varied from 17 to 30 per minute, that the patient had attacks of transient loss of consciousness with cessation of the pulse at the wrist, that the apex beat was situated well outside the nipple line, that pulsation or small-beats, numbering 50 or 60 to the minute, occurred regularly over the third left interspace just to the left of the sternum, and synchronous with pulsations in the veins of the neck. There was a systolic murmur at all areas, but no sounds were audible accompanying the small pulsations. There was in this case no evidence of arterio-sclerosis. *Post-mortem* disclosed a greatly hypertrophied and dilated heart.

In Hay's second case the patient was sixty-two years of age, and his illness commenced with an attack of unconsciousness three years ago. He had marked dyspnœa on exertion: his pulse was 32 per minute; the radial and temporal arteries were uniformly thickened and tortuous. A tracing from the jugular vein showed two beats for each radial pulse.

Through the kindness of Dr. Clinch I have had recently under my care a patient who I think may be considered a typical example of the Stokes-Adams syndrome:—

He is sixty years of age, a gardener by occupation, and came under my care on 14th October complaining of vertigo and fainting fits. His family history is unimportant, and the only facts in his previous history necessary to mention are that till last May he always enjoyed excellent health, save an attack of pleurisy

when he was fifteen years old, and one or two attacks of influenza. In May last he was stooping in a yard screwing on a rose to a water tap: on rising he fell back on the broad of his back quite unconscious, and remained unconscious for about five minutes. Supported by two servants, he was then able to walk into the kitchen, sat down, and after half an hour resumed work. His mistress, however, having heard of his illness, although at this time he was feeling perfectly well, directed him to go home. He drove half the way and walked the remaining mile and a half. His people were having tea when he arrived, and, although he had taken a substantial meal of corned beef and potatoes, followed by two cups of tea earlier in the day, he drank another cup, and said he would go and tell Dr. Clinch about the attack. Outside his door he met a cart going in the required direction, so he got up and kneeled down, talking to the driver. He was not in the cart more than five minutes when he fell unconscious. The cart was turned towards his home, and, on arrival, he was lifted out by his sons and put lying on the grass. Dr. Clinch was sent for, and he had him carried into the house, and subsequently sent him some medicine which made him vomit. This attack of unconsciousness lasted between four and five hours. He remained in bed for a few days, and about two weeks later he had a third attack of unconsciousness while stooping in the garden. This attack lasted only a few minutes. Some weeks later, while working in a stooped position, he again lost consciousness, for about half an hour on this occasion. His fifth attack occurred while sitting in the garden pulling reeds. On another occasion an attack took place while he was stooped tying his shoe. It once happened while simply sitting on a chair he became unconscious and fell on the floor. At dinner, when half way through, he suddenly became unconscious and fell across the table. Between May and October he has had in all from seven to ten attacks of complete unconsciousness, lasting from a few minutes to several hours, generally induced by exertion, not attended by any epileptiform seizures or followed by any paralysis whatever. On the occasion on which Dr. Clinch saw him the breathing was stertorous. Since his admission to hospital he has had no attack of unconsciousness, but he has had slight attacks of vertigo.

On examination, he is a tall, fairly well-nourished, healthy-

looking man. He has a commencing arcus senilis. There is no distension of the veins in his neck, and no venous pulse. His arteries are rigid and tortuous, his pulse varies between 30 and 40, but has occasionally for a short time risen to 60. His apex beat is in the fifth intercostal space just inside the nipple line. The area of superficial cardiac dulness is increased in its horizontal diameter. At times a soft systolic murmur is audible over the left apex; the second sound at the base is accentuated. Between the beats there is absolute silence over the heart. No pulsations are visible in the third left intercostal space, and there is no venous pulse. By screening the patient with the X-rays the ventricle is seen to contract, and *suddenly* to fill up to its full size. Between the contractions no positive movements in the ventricle were detected. The lungs are slightly emphysematous. The abdominal viscera are normal. The urine contains no albumen and no sugar.

To sum up:

(1) The Stokes-Adams syndrome includes—(1) bradycardia; (2) pseudo-apoplectiform seizures not accompanied by convulsive movements or followed by paralysis; (3) arterio-sclerosis.

(2) Most of the cases described have occurred in elderly people; males have been affected more frequently than females.

(3) The attacks appear to be induced by exertion or a distended condition of the stomach, but they may occur spontaneously.

(4) From Stokes' astute observations on the venous pulse and Hay's beautiful tracing it is certain that auricular contractions may take place which are not followed by any appreciable ventricular impulse.

(5) Stokes heard sounds in the heart without feeling any impulse. It remains to be determined whether such sounds should be attributed to ventricular contractions too feeble to be felt, or should be explained by the contractions

of the auricles. Against the latter hypothesis it must be remembered that in health the auricular contractions are inaudible.

The attacks of unconsciousness are to be explained by an anæmia of the brain rather than, as Adams suggested, by a congestion facilitated by the cerebral arterio-sclerosis.

As regards the bradycardia, Huchard has suggested that it is due to the arterio-sclerosis of the vessels supplying the vagi centres, but bearing in mind (1) that in health the auricular systole starting in the remains of the sinus venosus spreads over the auricle through the auricular canal on to the ventricle; (2) Gaskell's experiment, in which by ligaturing the auriculo-ventricular region he prevented the auricular stimulus reaching the ventricle, which being left to initiate its own stimulus beat much more slowly; (3) that in certain cases of the Stokes-Adams syndrome the auricle undoubtedly contracts more frequently than the ventricle: bearing in mind all these points it seems probable that the cause of the bradycardia may be found in the heart itself, and may be due to some affection of the structures adjoining the auriculo-ventricular groove, whereby a condition of partial heart-block is induced.

Finally, in favour of this hypothesis is the fact that in Adams' case, at all events, there was advanced fatty degeneration of the heart.

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# EMPYEMA.

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Physician to Sir Patrick Dun's Hospital.

[Read in the Section of Medicine, January 19, 1906.]

*Πλευρῖτις νοσός*. the complaint in the side, was recognised by Hippocrates and other ancient Greek writers, and, as we all know, was for centuries confounded with other intrathoracic inflammations.

Since it is now plain that the recognition of pleural effusion can be determined only by physical signs, and not by symptoms, it is obvious that valid differential diagnosis was unattainable before the physical discoveries of percussion by Auenbrugger (1764) and of auscultation by Laennec early in the last century.

Wintrich (1854) was the first to lay the foundations of accurate diagnosis upon the sure basis of physics and physiology, and his essay is a landmark in the history of pleuritis.

Next came closer investigation of the pathology of inflammation, and the complete diagnosis of pleural effusions is so intimately bound up with their pathology that it is not easy to avoid overlapping of these two aspects of the subject in hand.

My task, however, in this paper is to introduce the subject from the clinical side, and to this point of view I will keep as closely as possible. Without attempting a systematic survey, some special topics for discussion will be suggested. My remarks will deal with the two branches—viz., Ætiology and Diagnosis.

So far as the broad features of pleural effusions are con-

cerned it is quite sufficient to group them under two subdivisions—

(1.) Sero-fibrinous.—The per cent. of albumen is sufficiently exactly given by Reuss's formula.

(2.) Purulent.—$A = \frac{3}{8}$ (S–1000)—2.88 (Exudates);

$A = \frac{3}{8}$ (S–1000)—2.73 (Transudates).

Reuss's formula has been checked by gravimetric estimations. Take a transudate of sp. gr. 1012, subtract the constant 2.73 from $12 \times \frac{3}{8}$ and we get 1.77 per cent. of albumen. Similarly, an exudate of sp. gr. 1020 works out as 4.62 per cent. of albumen.

Other admixtures—*e.g.*, blood or putrefactive products—are either accidental or incidental.

In multilocular effusions some of the cavities may contain pus, and others sero-fibrinous fluid.

An important feature, clinically, of purulent effusions is the corroding and peptic action which they display upon the surrounding tissues. By such chemical actions they penetrate into unexpected quarters, tunnel into the lung, or eat their way through the surface tissues (empyema of necessity). This event is most likely to happen with acute empyema and when there is but a thin layer of fibrinous exudate on the pleura.

### ÆTIOLOGY.

Here the main advance in our knowledge is the replacement of vague hypotheses as to causation from exposure to cold, and such like unsatisfying notions, by the more definite and illuminating doctrine that most pleurisies are due to and are caused by infective agencies.

If exposure to chill, beyond weakening the resisting power of the body, ever does actually bring about an internal inflammation the mischief may, perhaps, be more rationally attributed to the production and influence of endogenous

chemical poisons, or the chill suffices to waken into activity dormant tubercle lying latent in lung or bronchial glands.

The pathologists who share in this discussion will, doubtless, enter fully into the bacteriology of acute pleurisy. This must surely form the basis of any sound classification of the different forms of the disease. There is no essential bacteriological difference between serous and purulent effusions.

We must distinguish between primary and secondary infections, and we have frequently to allow for cases of mixed infection—*e.g.*, tubercle bacilli and streptococci.

Suffice it here to say that evidence is steadily accumulating to establish three points, viz.—

(*a.*) The frequency and significance of the tubercle bacillus, especially in young adults. The after history supports this statement, and also the results of inoculation experiments.

(*b.*) The comparatively favourable outlook of effusions, although usually purulent, when due to the pneumococcus.

(*c.*) The serious and frequently fatal character of cases due to acute streptococcus invasion. (This is not universally admitted.) Streptococcal empyema is rare in children, but common in adults.

In one year von Ziemssen observed in his clinic eighteen cases of pleural effusion following on pneumonia, and all, without exception, were proved to be purulent. Yet they nearly all recovered, and two cases were dealt with merely by puncture and aspiration. So recently as 1860 pleurisy was stated by some authors to be rare in children.

It is still true that empyema in children is more often overlooked, and does not run quite on the same lines as in adults, and I invite attention to some points. For example, in adults serous effusions are four times as common as purulent effusions, but in children they occur in practically equal numbers. Fully 75 per cent., perhaps nine-tenths of cases of empyema in children under five years, occur with or follow

upon pneumonia. I will not dwell upon the differences in the visual, percutory and auscultatory signs, but it is well to recall the significant aspect of a young child suffering from empyema. Are we not struck, as Barlow long ago pointed out, by the emaciation, the sallow or lemon-coloured skin, the clubbed fingers without cyanosis, and hectic fever absent or slight?

Goodhart lays stress upon puffiness of the face in cases of large effusions.

Bilateral empyema is very rare in adults, but has been more often observed in children. In adults, the latency of pleural effusion, *quoad* symptoms, must be familiar to most practitioners.

DIAGNOSIS.

Since the treatment of pleural effusion may and does vary according to the form of the disease we must inquire into the means at our disposal for arriving at an exact diagnosis.

Dr. Hadley, in a brief and excellent communication to the *British Medical Journal*, Oct. 21st, 1905, summarises the data available for this purpose under seven heads:—

(1.) Clinical.
(2.) Cultural.
(3.) By inoculation.
(4.) By tuberculin.
(5.) Jousset's microscopical method.
(6.) Cytological.
(7.) Sero-diagnosis.

To this list may now be added radiography.

Much good work has been done by French and German physicians and pathologists in several of these lines, the special discussion of which may be left to the other speakers.

The two most reliable aids, as well as the most convenient, are—

(*a.*) The determination of the cell-elements present in the effusion, as to number and kind.

Many of us will recall Dr. Earl's Presidential Address to the Section of Pathology on the scope and results of cytological investigations.

(*b.*) Jousset's inoscopic method.

The principle of this plan consists in peptonising, by artificial digestion, the clot that usually separates from the pleural exudate, and then microscopically examining the sediment yielded by centrifuging the digested fluid.

Jousset states that in twenty cases of primary sero-fibrinous pleurisy he was able, by this means, to demonstrate tubercle bacilli in all of them.

The tuberculin method is not quite free from danger, and some have likened it to looking for a gas leak with a lighted candle.

The remainder of my remarks will be devoted to a necessarily brief and fragmentary consideration of a few points in relation to the physical signs of pleural effusion, and I would ask special attention to the problem of the degree of pressure existing in the pleural cavity.

What is the smallest amount of liquid in the pleura that can be surely recognised by physical examination? Probably not less than 10 fluid ounces—*i.e.*, half a pint.

What are the best means of detecting the presence of fluid? It is hardly necessary to emphasise the value of the information which can be gleaned by a careful *inspection* of the thorax as to form and movements.

We must bear in mind that a young child's thorax is circular rather than elliptical in outline, and that cyrtometric measurement seldom is of much account in children.

Speaking generally, *percussion* is, diagnostically, undoubtedly more valuable than auscultation, and it can scarcely be over-rated when intelligently carried out.

With effusions of considerable amount, and in the absence of extensive adhesions, it is often easy to verify the existence

of the S-shaped upper limit of dulness, or, as it is sometimes called, Damoiseau's parabolic curve (1843). This curve has also been investigated by Garland and Ellis. It is best determined in the sitting position. Perceptible variation of the curve of dulness with change of posture of the patient, although not always obtainable, is a sign of considerable value, and is almost absolute proof of the existence of a notable mass of fluid. It is better marked with transudates (renal or cardiac) than with inflammatory exudates.

*Auscultation.*—The signs obtainable by this method are less convincing and more fallacious, and differ considerably in the child and in the adult. I have several times verified Baccelli's sign—the exaggerated transmission of the *whispered* voice through thin serous effusions, as compared with its extinction by a purulent effusion—that is, one rich in cells. The sign, I am told, was plainly heard in my own case some years ago. I was suffering from pleural effusion, consequent upon an extensive hæmorrhagic infarction of the lung.

Vocal fremitus in young children is seldom, if ever, to be obtained, and in many women it cannot be elicited.

Bronchophony may be heard through a considerable mass of pleural fluid under favourable conditions. I am of opinion that bronchophony is better appreciated either by the naked ear or by the single stethoscope, keeping the other ear closed, than by the binaural instrument. A specially difficult case is presented by the combination of a small effusion with pulmonary atelectasis and catarrhal pneumonia.

In regard to vocal fremitus two points are to be noted—

(*a.*) Contrary to what is often taught, vocal fremitus in fibrinous pneumonia is not infrequently normal, or even *weakened.*

(*b.*) Vocal fremitus is often increased just above the upper limit of a pleural effusion.

### EXPLORATORY PUNCTURE.

Exploratory puncture—preferably with a small aspirator, *not* a hypodermic syringe—is the most valuable and certain mode of ascertaining the presence of fluid, and its routine employment in all doubtful cases represents a real and important advance in clinical diagnosis.

Dr. Ewart has pointed out that, in the evolution of the treatment of pleural effusions, three periods may be distinguished :—

(1.) From 1800–34 therapeutic measures were purely medical. Paracentesis was hardly ever practised.

(2.) From 1834–69 (from Davis to Dieulafoy) paracentesis gradually came into fashion.

(3.) From 1869 onwards medication fell into the background and surgical procedures took the lead.

Exploration fulfils two objects—

(1.) Positive determination of the presence of fluid. Very valuable in localised, encysted accumulations.

(2.) Informs us as to the nature of the fluid, and so directly influences treatment.

Care must be observed as to—

(1.) Depth of puncture—not too far, not far enough. Viscidity of fluid is spoken of as a possible hindrance, but it is a difficulty theoretical rather than real.

(2.) Several, perhaps many, punctures may be required before the fluid is found.

(3.) Possibility of mischief.

I have never had the ill luck to wound an intercostal artery, and Naunyn, in a very extended experience, once only met with such a misfortune. The patient died in a few minutes owing to a huge hæmothorax. At the autopsy the intercostal artery was proved to be exceptionally large and to be in a state of atheromatous degeneration.

A difficult problem in diagnosis sometimes arises in connec-

tion with peripleuritic abscesses, subphrenic or elsewhere. Some years ago I met with a puzzling case of this kind. At the autopsy a large and foul subphrenic abscess was found which had burrowed downwards inside the sheath of the right rectus abdominis.

Some help may possibly be got by noting whether, during aspiration, the fluid drops from the trocar upon inspiration or expiration. If the former, this would indicate that the origin of the fluid was below the diaphragm. If exploratory puncture be followed up by withdrawal of a considerable amount of fluid by siphonage or aspiration we should be careful not to remove more than 1,000 cc. (1¾ pints) at one sitting.

Naunyn once observed pneumothorax, due to rupture of the lung, follow upon too extensive evacuation of fluid.

Once only have I noted serous or albuminous expectoration after tapping the chest. A very surprising circumstance, and one which I can confirm, is the absorption of a pleural exudate after a single exploratory puncture. Naunyn has observed this satisfactory result at least five times. One of the best signs of commencing absorption after puncture or tapping is the increased urinary flow, which may reach to 1,500 cc.

The varying extent of pleuritic accumulations raises for consideration the question of intra-pleural tension, one of considerable practical significance, and one which is apt to be misapprehended.[a]

We frequently hear such expressions as these—"The chest full of fluid," "compression of the lung," "the heart is pushed over to the opposite side," &c., &c. Now, the problem

[a] *Cf.* Clinical Lecture on the Physics and Diagnosis of Pleural Effusions. Dr. Sutherland. *Lancet*, July 23, 1903. A valuable experimental paper by Dr. S. West on Intra-pleural Tension. *Med. Chir. Trans.* LXXXI. P. 273.

is undoubtedly a complex one, and has not been fully solved as regards liquid effusions. With gas (pneumothorax) the difficulties of the problem are not so great. Our present state of knowledge may, I think, be summarised as follows :— The lungs are multilocular air-bags, highly elastic, and are normally in a constant state of over-distension. Hence there is a necessary tendency or effort, so to speak, to retract or collapse by virtue of their own elasticity, and the two layers of the pleura are subject to a continuous stress which tends to separate them. This stress is called the intra-pleural tension, is obviously negative, and corresponds to a pressure of from 6–8 mm. of Hg.

Three factors influence the intra-pleural tension—

(*a.*) The elasticity of the lungs, first and chiefly.

(*b.*) The resistance of the chest-wall.

(*c.*) The respiratory oscillations in the pulmonary tension.

These correspond, in health, to a pressure of about 1 to 1½ inches of water.

Even with the most powerful expiration, as in coughing or vomiting, the intra-pleural tension remains negative. Now, suppose some fluid over and above the normal moisture accumulates in one pleural cavity, what must happen ?— (1.) The corresponding lung at once takes its opportunity, elastically retracts, and holds up, so to speak, the fluid. The anatomical relations of the lung help us to understand how it is that Damoiseau's curve may be assumed—a phenomenon inexplicable as the direct result of fluid *pressure.* (2.) As the fluid increases, the elastic recoil of the lung goes on its way until its elasticity is exhausted. Thenceforward, and not until then, can we rightly speak of a positive mechanical pressure of the effused fluid producing true compression of the lung, which is ultimately reduced to an airless cake, lying in the vertebral groove. This positive pressure may amount to 30 mm. of Hg or more. (3.) The elastic tension of the

sound lung will be increased, and an aspiratory action exerted on the opposite side, because the normal balance of opposing forces is disturbed.

As regards the diaphragm, it is, at first, not depressed, but, on the contrary, in many cases it is elevated, especially on the left side, as can often be made out in children. Bulging below the ribs is a late sign of pleural effusion. On the right side we have to allow for the weight of the liver, added to the weight of the super-incumbent fluid. If in a case of right-sided pleural effusion the liver is undoubtedly depressed we know that intra-pleural pressure is positive, and the amount of exudation is, therefore, great. (4.) Displacement of the heart, which is not always so great as sometimes thought, is dependent upon two factors—

(*a.*) The quantity of fluid effused.

(*b.*) The degree of elasticity in the *sound* lung.

Since two-thirds of the heart lie to the left of the middle line a moderate amount of fluid in the left pleura may be attended by a notable displacement of the heart to the right. This displacement is mainly due to the greater *drag* of the larger amount of lung tissue between the heart and the right side and *not* to the direct pressure of the left pleural fluid as is so often supposed. Torsion of the aorta or inferior vena cava has not been demonstrated.

Dr. S. West determined the pleural pressure in twenty-seven cases of serous effusion, and found that the pressures varied greatly and irregularly, and that there was no definite relation between the degree of effusion and the amount of pressure. Even with a large effusion there may ultimately be a negative pressure. This is an important fact in relation to operative measures.

In ten cases of empyema Dr. West found that in all of them the pleural pressure was considerably increased and that the respiratory oscillation was practically absent.

Sudden death is more to be feared with large effusions on the right side.

Time forbids me from discussing this deeply interesting question of sudden death, as well as some other topics, such as pulsating empyema.

# THE SURGICAL TREATMENT OF EMPYEMA.

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[Read in the Section of Medicine, January 19, 1906.]

I HAVE to thank the officers of the Medical Section for the honour they have done me in asking me to present to the Academy my views on the surgical treatment of empyema. As I may assume that I have been asked because, among any other reasons, I have a long and large experience, I think I shall do best by placing that experience at the disposal of my colleagues for their help or criticism. I shall not attempt, even did the time at my disposal allow, to discuss different views and various procedures, except in so far as an occasional reference may be necessary in order to elucidate a point or give weight to a decision, but content myself with speaking of what is best in practice, and giving my reasons why I have found it so.

As regards the diagnosis of empyema, the matter which most concerns the surgeon is its location and area. Exploration of the pleura with the finger in the course of many thoracotomies has shown me that an encysted empyema is more common than has generally been held, and that its area is difficult or impossible to determine without such exploration. Stethoscopic examination often fails to draw an exact line between the dulness over an encysted empyema and the dulness due to pressure on the surrounding lung. Hence it is that so often a hypodermic needle fails to find pus at its first or second puncture; it has been pushed into a dull area surrounding the empyema, due to pressure or

inflammation. The practical outcome of this is that a large hypodermic or small aspirating needle should be used to determine the purulent nature of the fluid to be dealt with and the region in which to attack it. As for the method of attack, I may dispense with much remark on the operation of aspiration. I think it is dead, or should be so. The essence of any form of pleural evacuation is not merely that it may empty the cavity, but that it should provide free drainage. Can anyone who has ever seen the masses of semi-solid lymph which are discharged through the incision of a sufficient thoracotomy contend for a moment that they could be removed by aspiration or extruded through a small tube? Aspirations are bad treatment, and, inasmuch as they do not provide drainage or give exit to lymph, are dangerous as well as insufficient.

As regards the point at which operation by incision should be performed, no exact rule can be laid down, as the surgeon must be guided by various conditions in different cases. But, speaking generally, the sixth or seventh space in front of the posterior fold of the axilla is the point of election. Here the anterior edge of the latissimus dorsi affords a good guide, and the only tissue between the superficial structures and the wall of the thorax is the serratus magnus, the fibres of which can be separated without incision, and retracted during the later stage of the operation. By treating the serratus thus, a contractile collar is formed round the drain tubes, and the entrance and exit of air is limited as far as possible. The only general propositions I am prepared to state in addition to the above, as to the site of incision, are two:—First, that the opening should be as far back as is consistent with the tube not being occluded by pressure when the patient lies supine; second, that it should not be too low down, as, if it be, the ascent of the cupola of the diaphragm, which is one of the chief provisions of nature for the diminution of the size

of the pleural cavity, may occlude the tube or even cover the drain opening, and thus impair its function.

The operation of thoracotomy for drainage should, as a routine practice to which but few exceptions are permitted, be effected by removing a portion of a rib, and not by the intercostal method. The space between the ribs does not permit the introduction of a finger for exploration, and is so narrow that the drain tubes, if of sufficient size, are pinched and occluded between the ribs. The operation, also, can be much more cleanly completed by the periosteal route, as afterwards described, and is practically free from any risk of hæmorrhage.

I operate in the following manner:—The patient being anæsthetised, by chloroform for choice, is placed semi-supine on the sound side, or if this be not safe owing to difficulty of breathing, on his back, with the seat of operation projecting over the edge of the table. An incision about three or three and a half inches long is made over the centre of the selected rib and paralleled to its axis. This cut is carried down to the substance of the serratus magnus; the fibres of that muscle are then separated by a director or other half-blunt instrument, and held apart by retractors, so as to expose the rib. The periosteum is then incised and separated from the rib by an elevator, great care being taken while working round the deep surface of the bone not to perforate the pleura. This latter is an important point, as if you leave the pleura uninjured until the piece of rib has been removed, you can then tear the necessary opening in it with any half-blunt instrument, such as a Watson-Cheyne dissector or a director, your hand working under cover of a towel spread over it, so as to catch the pus and prevent the mess which is made by its usual violent expulsion. I know no instrument so good for separating the periosteum of a rib without opening the pleura as the curved end of Fergusson's director. In most of these cases the

pleural covering of the rib is very much thickened, and its elevation with the periosteum is easily effected without perforation. About one and a half inches of the rib should then be removed, either with a special shears or an ordinary bone forceps. Some surgeons prefer a saw, but its use prolongs the operation and adds the risk and dirt of a premature opening of the cavity. I have seen no ill effects follow the bruising of a rib from the use of a cutting forceps. In cases where the rib is very large, or in old people, in whom it is very hard, it may be well at times to notch it with a key-saw preparatory to using the shears. The pleura is then opened in the way indicated, the pus and lymph allowed to discharge, and the cavity thoroughly explored by the finger. I do not hold with the practice of making two drain openings, but always put in two large rubber tubes fastened together by a safety-pin, which also serves to prevent the tubes escaping into the thorax. I have tried all sorts of drain tubes for the pleura, but found none so good as ordinary rubber ones of large size, say No. 14 or 15.

The tubes should not be perforated, except where they lie within the thorax, as if the parts passing through the thoracic wall have openings they will facilitate extravasation of pus into the soft tissues. They should be long enough to enter the cavity for three or four inches, as they can be gradually shortened as the sac contracts. Flanged tubes are not to be recommended, as the pus lies between the flange and the skin, and causes excoriation.

The object of having two tubes side by side is not only to promote more free drainage, but also to facilitate the washing of the pleural sac should it become necessary. Irrigation of the pleura, as a routine, is a practice best avoided. It is often dangerous, and has been known to cause fatal collapse or convulsions. It is generally only required where fœtor exists or where discharge does not diminish satisfac-

torily. The choice of the antiseptic, if any, to be used with the irrigating fluid is one to which every surgeon will apply his own experience; personally I incline to a very dilute solution of mercuric potassium iodide.

Thoracotomy by this method can usually be very rapidly performed, occupying only a few minutes. This is a matter of importance, because persons subjected to it are often in a state which renders anæsthesia dangerous and speed most desirable.

There is no doubt that most cases of empyema get well if they are drained efficiently and in time, and that deaths or operations subsequent to drainage are results of drainage being too long delayed.

We have to consider what courses may be adopted to help the expansion of the lung in a case where drainage by itself seems to fail before we resort to the final treatment of thoracoplasty. The main help to the physician where thoracotomy is not effectual is the application of atmospheric pressure of either the negative or positive kind. Of the negative, or that which seeks to help the expansion of the lung by diminishing the pressure of the external air which applies itself through the opening made in the chest wall, I can say nothing favourable. The human machine is not only very complex, but one working under vital conditions quite unlike those which surround and govern apparatus in a laboratory, and until we can render a patient immobile, and place him relatively in the circumstances of a physical machine, I see no hope of bringing a suction apparatus into play. I have seen all sorts of endeavours, in my time, to deal with the living organism on elaborate mechanical principles, but seldom with much effect.

By positive pressure more may be effected. The plan of using condensed air in the lungs has been practically abandoned, as it was found inapplicable in most cases, and

dangerous in some. But other positive methods in the form of forced respiratory efforts are exceeding useful. The most ordinary and, perhaps, best forms of respiratory gymnastics are two:—One consists of forcible inspiration and expiration used systematically and for stated and increasing periods; the other of James's plan of blowing water from one gallon bottle to another through tubes arranged for the purpose. This device is often most efficacious in assisting the expansion of a compressed lung, and obviating the necessity for Estlander's operation.

But the time may come when Estlander's operation of thoracoplasty must be undertaken, and better too soon than too late. There are many cases where, commencing with a drainage operation, conditions are found which demand that the proceeding should there and then be completed by Estlander's method. If when the pleural cavity be explored by the finger the lung be found compressed into a firm mass not approaching the wall of the chest, and if the condition and history show that this state of affairs has existed for some time, it is better not merely to drain the pleura, but also at once to diminish the size of the costal boundary by the removal of portions of several ribs, so as to allow it to approach the compressed lung, and thus do its share in lessening the cavity. It should be remembered that no case of this kind is too bad for surgical treatment unless the patient is dying or too far gone to bear the immediate effects of the operation. There are several factors which lend themselves to the closure of an apparently irremediable cavity. One is the yielding towards the diseased side of the contents of the middle mediastinum. The second is the rising of the cupola of the diaphragm. The third is the falling in of the chest wall when Estlander's operation has been done. The fourth is the expansion of the lung. The first three are so potent that they may effect the closure of the pleural cavity even

when, owing to the failure of the lung to expand, the fourth does not come into play.

As regards Estlander's operation, I hold some strong views as to its method of performance. It is, perhaps, most generally recommended to expose the ribs, of which it is proposed to remove portions, by raising an angular or U-shaped flap of soft tissues. This makes a raw surface of large extent, and adds to the severity of the operation; the more so as the wound may be delayed in healing by pleural pus contaminating it. I remove the ribs by incisions parallel to their axes. This at once avoids a large wound area, and interferes less with vessels and nerves than a U-shaped incision. The first incision is made in the same way as for thoracotomy, the periosteum resected, and as many inches of the rib as may be necessary removed. If the soft tissues be loosened with scissors, and retracted up, and then down, the rib above and that below can be resected through the same superficial incision. In this way one skin cut will serve for three ribs. If it then be necessary to remove portions of two or three more ribs, a second incision will suffice. One of the important reasons for exploration of the empyema when opening it for drainage is that it gives information as to which, and how many, ribs require operation if thoracoplasty should become necessary. Supposing no such information has been available, it is well to incise the periosteum and pleura when the portion of the first rib operated on has been removed, and by introducing the finger find how far you must carry your operation.

It is usually recommended to remove the periosteum when the ribs have been resected, but this adds much to the bleeding and length of the operation, and increases its danger. Besides, it is quite unnecessary, as I have never seen any subsequent trouble or failure in effect due to the retained periosteum.

Thoracoplasty has been described as a dangerous and

bloody operation, and so it may be when performed in a certain way. But if U-shaped incisions be avoided, and one or two straight ones used, and if they be made over ribs and not over intercostal spaces; if the periosteum be not excised, and if parts of too many ribs be not removed, or too great a length of them, the bogey of danger will disappear. As for the number of ribs to be operated on, no general rule can be made; we must be governed by the general circumstances of the case. It is seldom necessary to operate on more than three or four, and it should be remembered that the removal of a moderate number will be followed by an hour-glass-shaped contraction of the side of the chest, which will produce enough diminution without that general falling in which can result only when a larger number have been subjected to operation.

Finally, in connection with this treatment, let no surgeon despair of a good result in even the most unfavourable cases. The lung often begins to expand after a very long time and when, apparently, in a desperate condition. I have over and over again been astonished at the good recovery which has taken place when hope had almost been abandoned.

Having said so much of the past and present position of the surgical treatment of empyema, may I pause for a moment to make a forecast of its future. He who runs may read to-day that we are on the eve of a development of the treatment of this and a multitude of allied conditions which will lend itself to the assistance of surgery, and help, or in many instances obviate, operative measures. The studies of the opsonic power of the blood and of the use of bacterial vaccines, which is being so profoundly studied by Wright and others, are passing through the regions of promise and approaching the country of performance. I believe that we shall soon have to aid us means which will revolutionise surgery. Up to the present the effects of the vaccines have chiefly been

directed to the study of tubercle; but the light is spreading among pathological workers, and no man can say where it may go. It is finding its way in many directions. For instance, an excellent communication was made to the Section of Dental Surgery at the last meeting of the British Medical Association by Mr. K. W. Goadby on the treatment of alveolar osteitis by vaccines. He shadows a future treatment of nasal and antral suppuration which will probably revolutionise our views on such conditions. However, I cannot delay to say more on a fascinating subject which at present is in the hands of investigators, but which I believe will soon be ripe for practical use.

Finally, I may epitomise as follows the points of my communication, about which I should like to hear opinions:—

1. That an empyema cannot be drained too early.
2. That the best way to drain is by removing a portion of a rib.
3. That thoracoplasty should not be delayed too long.
4. That it should be effected by one or more incisions parallel to the ribs.
5. That removal of the periosteum need not be practised.
6. That few cases should be allowed to die, even in the latest stages, without an attempt to relieve them by operation.

# THE BACTERIOLOGY OF EMPYEMA.

By H. C. EARL, M.D. Univ. Dubl., F.R.C.P.I.

[Read in the Section of Medicine, January 19, 1906.]

In the time at my disposal it would be impossible to treat at all fully of the pathology of empyema, and I have thought it best, therefore, to try and lay before you a short account of the bacteriology of this condition only. Even as regards the bacteriology, I shall chiefly deal with certain points which appear to be of clinical interest.

It is not possible to deal with the bacterial ætiology of purulent effusions separately from that of serous and sero-fibrinous effusions; for the micro-organism that in one case causes a purulent effusion, in another causes a serous or sero-fibrinous effusion. Moreover, a serous effusion may become purulent, and that not on account of anything introduced into the pleural cavity by the first puncture, but from the further action of the microbe that it already contains, and in some cases, where the effusion is multilocular, different loculi may contain fluids of different characters. Thus, any consideration of the micro-organisms causing purulent effusions must include more or less allusion to non-purulent effusions. Of the micro-organisms found in pleural fluids, some always cause purulent effusion, and others either serous or purulent. Of the latter group, some cause serous effusions more frequently than purulent, and others purulent more frequently than serous. Thus, Wassermann states that of 12 effusions caused by the Friedländer bacillus, all were purulent; of 14 due to the typhoid bacillus, 7 were serous, 6 purulent, and 1 hæmorrhagic; of 35 due to streptococci, only one remained

serous; while of 145 due to pneumococci, only 36 were purulent.

In taking the fluid for examination strict asepsis is necessary, and it is important that the fluid obtained should not be mixed with any antiseptic, as in its examination it is necessary not only to make microscopic preparations, but often also to make cultures, and even occasionally to inoculate animals. The information obtained from stained films is sometimes sufficient, but cultures must often be made to identify the organisms present. Cultural examination should, however, supplement and not supplant microscopic examination, for there may be present organisms that have lost their power of growing while retaining their microscopic characters; or, as is the case in putrid effusions, organisms may be present which would be missed by the usual culture methods, as they only grow under anaërobic conditions. Effusions are sometimes sterile, and importance has been attached to the condition of sterility as being strongly suggestive, at least, of a tuberculous origin.

Now, a very careful examination must be made before an effusion is declared to be sterile, for, on account of their fewness, it may be impossible to find micro-organisms in microscopic preparations, while they may be found in cultures. Thus, in a case where I failed to find any micro-organism in stained films, a large loop of the pus yielded in a plate cultivation eight colonies of Staphylococcus albus. If no organism be found, it must not, of course, be assumed that the effusion was originally sterile, for where a series of examinations have been made it has been found that at an early stage micro-organisms could be demonstrated by the microscope and by culture, while later no micro-organisms grew, but they could still be found microscopically, though in a morphologically altered condition; and, later still, none could be found, either by culture or by microscopic examination. That is to say,

that an effusion caused by a micro-organism may become sterile, and this is the case particularly, it is said, in effusions—serous or purulent—due to the typhoid bacillus.

Empyema is caused, as far as direct causation goes, by one or more of the following organisms:—Pneumococcus, streptococcus pyogenes, tubercle bacillus, staphylococcus, typhoid bacillus, and possibly bacillus coli, Friedländer's bacillus, and, in the case of putrid effusion, by anaërobic organisms.

As to their relative frequency, statistics show that 75 per cent. of empyemas are caused by pneumococci or streptococci. Netter found in 110 cases in patients of all ages—

| | |
|---|---|
| Streptococci alone in - | 44 per cent. |
| Strepto- and pneumococci in | 2.8 per cent. |
| Pneumococci alone in - | 26.7 per cent. |
| Staphylococci in - - | 1.8 per cent. |
| Tubercular and putrid - | 24.7 per cent. |

Hartwell found in 52 cases—

| | |
|---|---|
| Pneumococci in - - | 50 per cent. |
| Streptococci in - - | 33 per cent. |
| Staphylococci in - - | 8 per cent. |
| Tubercular in - - | 4 per cent. |

In another series there were found rather higher numbers for strepto- and pneumococci, with Friedländer's bacillus in 2 per cent., and 12 per cent. were tubercular.

When the cases occurring in adults and those occurring in children are taken separately, it is found that the numbers due to streptococci and pneumococci show remarkable differences. Thus, in adults Netter found—

53 per cent. due to streptococci and
17 per cent. due to pneumococci,

while in children he found

53.6 per cent. due to pneumoccoci and
17.6 per cent. due to streptococci.

In another series of cases among children he found 65 per cent.

due to pneumococci, while Koplik found 60 per cent. due to pneumococci, and Bythell found pneumococci alone or with other organisms in 90 per cent. of his cases; but Bythell's cases were observed in the Manchester Children's Hospital at a time when pneumonia was very prevalent in that district.

The statistics of other observers agree in the main with those of Netter.

Pneumococcal empyema generally comes on in connection with acute pneumonia, often a few days after the crisis, or in connection with broncho-pneumonia, but occasionally it appears to occur as an independent affection. It is not by any means certain, however, that it does occur independently of lung affection, and it must be borne in mind that the existence of broncho-pneumonia, in which pneumococcus often occurs, is not always easy to detect. It has been attempted, from an examination of the pus, to form some idea of the probable course of the disease. Thus, the view has been put forward that the shape of the cocci and the length of the chains they form has some value in prognosis, but this is entirely contradicted by the observations of most writers.

Bythell considers that the presence of a small number of cocci which stain feebly, grow scantily, and whose cultures die out rapidly, is a fairly reliable indication of a favourable course of the disease.

The presence of a large number of micro-organisms less frequently indicates an unfavourable course, especially if it be accompanied by well marked phagocytosis. Indeed, according to some observers, the amount of phagocytosis is the most reliable guide to prognosis—those cases in which phagocytosis is badly marked being most severe.

Netter considers that well-marked phagocytosis is merely a sign of the presence of many dead and weakened forms of the coccus, and no evidence of the activity of the leucocytes

against the microbes. But it is not necessary to discuss this question, for even if Netter is right the value of the amount of phagocytosis present as a guide to prognosis is not diminished.

Streptococcal empyema is generally secondary to pneumonia, broncho-pneumonia, gangrene or abscess of the lung. Occasionally it occurs as an extension from a suppurative process in the abdomen, and is not very infrequently met with as part of a general pyæmic process.

Now, the view has been held for the past fifteen years that the prognosis is very much less favourable in streptococcal cases than it is in pneumococcal cases. With regard to the latter, cases are recorded that got well without any operative interference, or by simple removal of the fluid without draining, and when such cases are subjected to radical operation they are considered to give much more favourable results than streptococcal cases do. My own experience, as far as I have been able to follow the cases from which I have examined material, is in accordance with this view, which is dissented from by only a few writers.

This more favourable course of pneumococcal cases is believed to be due to a tendency of pneumococci to lose their virulence, but the more unfavourable course of streptococcal cases must also be influenced by the more serious conditions in the lung and elsewhere which are often precursors of such cases. For it is easy to see that an empyema coming on a few days after the crisis of a pneumonia, and due to the pneumococcus, is much more likely to have a favourable result than is an empyema due to streptococci, and occurring as part of a pyæmia, or secondary to abscess of the lung, or to a purulent affection in the abdomen, apart altogether from the variety of organism present.

Both streptococci and pneumococci are generally in pure culture in the pus, but they may occur as mixed infections,

in which case the prognosis is determined by the more virulent organism present.

Next to the streptococcal and pneumococcal empyemas in frequency are those of tubercular origin, which form about 12 per cent. of all empyemas. They are not so common as serous effusions of the same origin, and the tubercle bacillus, though found more commonly in the purulent than in the serous effusions, is, however, present only in a small percentage of cases.

Of 13 cases of mixed serous and purulent cases recorded by Jakowsky, the tubercle bacillus was found twice in 1 serous and 1 purulent case. Seven of these 13 were sterile, 6 serous and 1 purulent. In the other 6 cases streptococcus was found in 3, staphylococci were found in 2, and pneumo- and streptococci together in 1. These statistics are fairly representative. Not only is it impossible in most cases to find the tubercle bacillus, but inoculations often fail, even in undoubtedly tubercular cases. As neither the absence of the tubercle bacillus nor the presence of other organisms at all disproves a tubercular origin of an effusion, it is necessary to seek other aids to diagnosis. The examination of the sputum is rarely of assistance, as if there is sputum at all it generally contains no tubercle bacilli, even if there is distinct tubercular disease of the lungs. This fact, which I have several times confirmed in cases which subsequently at *post-mortem* examination presented distinct tuberculosis of the lung, and in some of which the pleural fluid contained tubercle bacilli, is apparently to be explained by the fixation of the affected side, so that the sputum comes from the bronchi or from the healthy lung.

Cytological examination has been of use in deciding the nature of effusions of a serous character, but is, of course, not of use in purulent cases. Great stress has been laid by Levy and others on the sterility of effusions as pointing to a tuber-

cular origin, and no doubt this is of some importance, but it certainly has not the importance that was at first attached to it, for, as I have already pointed out, effusion due to other organisms than the tubercle bacillus may and do become sterile. The certain diagnosis of the nature of the disease in many cases of tubercular origin still remains, and is likely to remain, difficult.

Of the other organisms found in empyemas, staphylococci are occasionally found alone, and oftener as a mixed infection in tubercular cases. Friedländer's bacillus occurs rarely—in 2 per cent. or less of all empyemas. The cases are sometimes consecutive to broncho-pneumonia. The organism is almost always present in pure culture, but it has once been found with Staphylococcus albus and aureus in a case of tubercular nature. The effusion is always purulent, and the prognosis is said to be good.

Micrococcus tetragenes has been found in empyema, but always associated with other organisms. The gonococcus has also been described in one empyema, but this is very doubtful.

Pleural exudations containing the typhoid bacillus are rare. Remlinger, in 1900, published details of 31 cases collected from different sources, including 8 cases of his own which occurred in connection with typhoid fever or contained the typhoid bacillus. Of these, 14 were purulent, the remainder being serous or hæmorrhagic. In one case there was a bilateral effusion, serous on the right side, purulent on the left. Nearly all these cases contained the typhoid bacillus, generally in pure culture, sometimes with one or other of the cocci found in suppurative processes; 2 only contain staphylococci without typhoid bacilli. His own 8 cases occurred among 1,055 typhoid patients treated in the Belvedere Hospital at Tunis; 7 of these contained typhoid bacillus, and one Staphylococcus aureus. Since Remlinger's paper several other cases have been recorded.

He divides the cases into 4 classes—

1st. Those occurring at the very beginning of typhoid fever.

2nd. Those occurring at a later date, sometimes during convalescence.

3rd. Cases where the infection of the pleura by typhoid bacillus is secondary to other disease.

4th. Cases of empyema occurring during typhoid which contain not typhoid bacilli, but other organisms.

All the cases in the 1st class were serous, and contained typhoid bacillus, and all recovered. To the 2nd class 19 of the 31 cases belonged. Of these, 6 remained serous and 1 remained hæmorrhagic; 1 serous became purulent, and 2 hæmorrhagic became purulent; 8 were purulent when recognised, and 1 which had bilateral effusion was serous on one side and purulent on the other. Of these cases 5 died, all the deaths occurring in purulent cases. One of the purulent cases recovered with simple removal of the fluid. All these cases contained typhoid bacilli, but there was a great tendency for the organism to disappear during the disease. This occurred in 8 cases of the 19, in 3 purulent and 5 serous cases. The great majority of cases of these 1st and 2nd classes occurred on the left side. The 3rd class of cases described by Remlinger consists of 2 cases of empyema, both in tuberculous subjects; one of these contained typhoid bacilli alone, and the other tubercle bacilli and typhoid bacilli. Neither of these had any of the usual typhoid lesions at *post-mortem*. I do not know of any other case of this sort, but, of course, the pus from an empyema occurring in a subject known to be tubercular is not often subjected to careful examination.

Bacillus coli has been found in a few empyemas, once in pure culture, following on a severe colitis; in other cases with pneumococci or other organism.

In conclusion, I must refer very briefly to putrid empyemas. They occur in connection with a primary or secondary

gangrenous affection of the lung or in connection with a suppuration of a putrid character in the abdomen, and affect the pleura either directly by rupture or by extension from the peritoneum. Sometimes they are embolic in origin. The results of bacteriological examinations have been published in comparatively few cases, the most important paper on the subject being that by Guillemot, Halle and Rist in 1904. The pus from putrid cases always contains anaërobic organisms, frequently alone, sometimes with the cocci found generally in suppurative processes. There are generally several varieties of anaërobic organism present, but occasionally only one occurs. The organism most frequently found is an anaërobic streptococcus, which is non-pathogenic, and which is believed to be identical with an organism that occurs in the saliva. Bacillus coli was sometimes found in these cases.

The results obtained by the examination of putrid cases have not revealed so far anything of much clinical interest.

# EMPYEMA OR HYPOPHRENIC ABSCESS?

By SIR JOHN MOORE, M.D., D.P.H. Dubl., F.R.C.P.I.;
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[Read in the Section of Medicine, January 19, 1906.]

The short contribution to this discussion which I propose to make consists in notes of two cases illustrative of the difficulties which beset a differential diagnosis of empyema, or pyothorax, and hypophrenic abscess.

Case I.—A married woman, aged thirty years, was admitted to the Meath Hospital under my care from Ranelagh Road on May 8, 1894, with a history of three weeks' illness. She had been married for fourteen years, but had never become pregnant. Menstruation had been quite regular, but was often excessive, although there was no metrorrhagia. She had been losing flesh for a year, and had also been obliged to get up at night to pass water. Six months before admission she had suffered from an attack of what was called "influenza." Although she had taken ill three weeks before admission, she did not take to bed until a week later. Her complaint was of great shortness of breath and of stabbing pain in her back and the right side of the chest. The bowels were confined, so on Sunday, May 6 (two days before admission), she took castor oil, which was followed by an excessive motion, quite black in colour.

On the evening of her admission the axillary temperature was 99.2°, pulse 106, respirations 28. The physical signs pointed to a large right empyema. Next evening temperature rose to 100.2°, but it fell subsequently to 96.4° on the morning of May 12. Her condition at that time was critical, and pulse and breathing were becoming more and more rapid. A free incision was, therefore, made in the ninth intercostal space in the scapular line, and one hundred and seventy (170) ounces of most offensive pus were drawn off. The pus was deeply stained with bile, so that it

was believed that the liver was engaged as well as the pleura. The temperature rose on the evening of the operation to 100.8°. A temporary intermission of fever followed, but the thermometer rose to 103.2° on the evening of May 16, a septic diarrhœa set in, and the patient sank from exhaustion on the 19th.

The autopsy was made with great care by Mr. William Taylor, then House Surgeon to the Meath Hospital, now my colleague on the Hospital Staff. To him I am indebted for the following notes :—

" On opening the abdomen the left lobe of the liver was found to be about four times its normal size, to extend quite over to the left hypochondriac region, and to press up the lung on that side. The right lobe of the liver was nothing but an abscess sac. The gall bladder was unaffected. The neighbourhood of the pylorus showed thickening, the result of old adhesive inflammation round a gastric ulcer. There was a small opening through the diaphragm, which was adherent posteriorly as high as the fifth rib, and laterally as high as the seventh rib. There was also a moderate quantity of fluid in the right pleural cavity—about forty ounces in all.

" The right lung was greatly compressed and completely collapsed, save a small portion of the upper lobe."

In this case a diagnosis of empyema was made, whereas the suppuration was altogether below the diaphragm, constituting a hypophrenic abscess and involving the liver also. The starting point of all the mischief was probably a perforating gastric ulcer, in connection with which adhesive inflammation had occurred.

Case II.—A farmer, aged fifty-two years, was sent to me in October, 1905, for admission to the Meath Hospital by Dr. George Peirce Ridley, J.P., Surgeon to the King's County Infirmary, and Dr. John M'Michael, of Tullamore. They considered that the patient was probably the subject of Addison's disease from the pigmentation of the tongue which was present and from the

dark colour of the skin. The man was admitted on October 26, 1905, and died on November 7.

The patient complained of severe pain in his stomach shooting towards the right side and upwards into his head, making him feel dizzy. He said that the act of swallowing food was difficult, and accompanied by a sharp pain in his chest. These symptoms dated back four months to a time when he noticed the whites of his eyes and his skin becoming yellowish.

Foul gases were frequently belched up from his stomach, the throat felt sore and swollen, and he perspired freely. Sleep became broken. Obstinate constipation compelled him to take laxatives at frequent intervals. He lived on tea and porridge. About a week before admission cough began to trouble him, coming on in spasms or paroxysms. Whenever he tried to lie on his back or left side he was seized with intense pains. The urine became scanty, but he was frequently disturbed at night by an urgent desire to pass water. The specific gravity of the urine was 1015, but neither albumen nor sugar was present.

Of medium height, the patient weighed 9st. 6lbs. on admission. He said he had lost two stone within the previous two months, and was becoming terribly weak.

A faint blowing systolic murmur was heard at the apex of the heart, whence it was carried towards the back and left axilla (mitral leakage).

The abdomen was slightly full. Its wall was rigid and resisting on the right side. Intense tenderness on pressure was found over the hepatic and gastric regions. The liver was not appreciably enlarged, but appeared to be displaced downwards. Temperature was generally subnormal, the ratio of pulse to respiration was three to one. The pain, rapid wasting, progressive weakness, difficulty of swallowing, eructations of foul gas, and spasmodic cough suggested malignant disease of the œsophagus—a diagnosis which forbade the use of an œsophageal bougie, or of a stomach tube, for examination of the stomach contents. An extensive area of dulness on percussion existed on the right side of the thorax. The dulness was absolute over the base, relative at a higher level. Vocal fremitus was absent below; present—but not to a normal degree—above. These signs suggested the presence of a considerable collection of fluid in the right pleura. So I made an

exploration with a sterilised hypodermic syringe and drew off a clear, straw-coloured serum.

The condition of the patient now grew rapidly worse, and on November 4, 1905, his state was alarming. On that day I noted that the right side moved only slightly with respiration. The lower intercostal spaces on the same side were effaced. There was distinct fulness of the side. On pressure, some pitting was observed. From the fifth rib downwards there was absolute dulness on percussion. Over the left lung loud compensatory breathing was heard. From these signs I felt tolerably sure we had to deal with a hypophrenic abscess secondary to the œsophageal disease, and so I was not surprised when I drew off a syringeful of stinking pus in the seventh intercostal space quite in front.

Mr. Taylor now took charge of the case, and incised a portion of the right tenth rib in a line with the inferior angle of the scapula, after which he evacuated an enormous collection of very foul-smelling pus, such as we would expect in an empyema arising from gangrene of the lung. A large empyema drainage tube was introduced into the cavity whence the pus had been evacuated, but the condition of the patient did not improve. He sank quickly, and died three days later.

The *post-mortem* showed that there was an extensive cancerous condition of the œsophagus, which had ulcerated through into the posterior mediastinum, setting up a suppurative mediastinitis. From this the inflammation spread to the pleura, giving rise at first to a serous effusion upon which the infection quickly became engrafted, converting it into the purulent condition found at operation—the whole right pleural cavity had been filled with pus. The examination of the abdomen revealed nothing abnormal.

In a clinical lecture on Subdiaphragmatic Abscess, delivered at the Hospital for Consumption and Diseases of the Chest, Brompton, and published in the third volume of the fourth series of "International Clinics," 1894, Mr. Rickman J. Godlee observes that abscesses beneath the diaphragm are very difficult to differentiate from, and are very often com-

bined with, diseases of the chest proper. In his lecture, Mr. Godlee describes examples of subdiaphragmatic abscess, arising not only from the liver, stomach, and the spleen, but from inflammation about the cæcum and the kidney, from rupture of the duodenum, and from caries of the ribs, and from Pott's disease of the vertebræ. He mentions the case of a lady who was sent to him on account of what was supposed to be an empyema on the right side. There was dulness in front to the level of the second rib, but the upper part of the abdomen was occupied by a large, rounded swelling, obviously connected with the liver. On enlarging a wound through which a collection of matter had been previously evacuated, Mr. Godlee found that the cavity was all below the diaphragm, and consisted of a huge suppurating hydatid cyst of the liver.

Again, he describes the case of a girl, aged twenty, who was suddenly seized with symptoms of the rupture of some hollow abdominal viscus. From this she rallied, and subsequently presented physical signs which closely simulated those of fluid in the left pleura. He was told it was an empyema, and that stinking pus had been drawn off through a canula inserted below the ninth rib in the scapular line. He repeated the exploration, and was astonished that perfectly clear and odourless serum escaped. Subsequent inquiry into the case convinced Mr. Godlee that it was one of ruptured ulcer of the stomach, and that the matter was situated between this viscus and the diaphragm.

In a third case, a girl, aged sixteen, was supposed to have empyema—a needle was inserted, but no matter was found in the pleura. On January 6, 1890, a piece of the left eighth rib was removed about the posterior axillary line, and a cavity was opened which contained some ounces of very foul matter. The patient bore the operation well, but sank and died on the evening of the following day. At the

time of the operation the matter was supposed to be in the pleura, but at the *post-mortem* it proved to be beneath the diaphragm.

Mr. Godlee reminds us that a subdiaphragmatic abscess may be accompanied by the presence of fluid in the pleura, resulting (it may be) from "sympathetic" inflammation, or from the perforation of the diaphragm by the abscess; or the same cause may give rise to the effusion of fluid in both situations.

He gives cases also in illustration of the difficulty of estimating the relation of an abscess to the diaphragm when suppuration follows caries, or necrosis of the lower ribs or rib cartilages, or of one of the lower dorsel vertebræ. It was such a case that Dr. Walter Smith submitted to this Section on December 13, 1889. His paper was published in the eighth volume of the "Transactions of the Royal Academy of Medicine in Ireland," page 19 (1890).

# THE SURGICAL TREATMENT OF EMPYEMA.

By SIR ARTHUR CHANCE, P.R.C.S.;
Surgeon to the Mater Misericordiæ Hospital, Dublin.

[Read in the Section of Medicine, January 16, 1906.]

THE policy of surgeons with regard to empyema might be written on a visiting card—early and efficient drainage, expansion of the lung, and possibly removal of the thickened pleura of the chest wall by operative means. But in putting these simple principles into effect we are confronted with the difficulty that arises from the widely different varieties of the disease. Empyema may be associated with pneumonia, with tubercle, with injury, with the introduction of septic organisms, or with abscess formation in neighbouring viscera, as the liver. It may be unilateral or bilateral; there may be one or more cavities. For all these varieties different methods of treatment are required, and within the limits of the time allotted to me it is quite impossible to do more than glance at the subject. At the outset I may say that in few conditions is the co-operation of the physician more necessary, not only as regards diagnosis, but in the post-operative treatment. I like to take care of the cavity and the chest wall, and leave the lung and the rest of the patient to the physician.

With regard to drainage, for an ordinary meta-pneumonic empyema my practice briefly is:—Operate as soon as the presence of pus is certain. Use a general, rather than a local, anæsthetic. I generally adopt chloroform, with a little ether sprinkled on the mask.

The position of the incision depends, of course, on the boundaries of the cavity; but where possible I think that the balance of advantage is in favour of the eighth or ninth

rib, just external to the line of the angle of the scapula. Drainage in either the recumbent or the upright position is more effective than if the usual mid-axillary position higher up is adopted.

I lay stress on the wisdom of making a short skin incision; two inches is usually sufficient. By moving the soft parts to and fro with retractors, quite a long portion of rib can be removed. A long incision, especially one needing sutures, creates unnecessary difficulty in after treatment. Portion of a rib should always be removed, and this is best done either by Giglis' saw or by an ordinary bone forceps. I deprecate the use of the clumsy rib shears, as they cause unnecessary detachment of the periosteum. The drainage tube should be very large, about an inch in diameter. It should almost fill the opening, and should not have a flange, which retains pus about the wound, but should be fixed in place by a brooch-shaped safety pin, such as I show. I would give full credit to the inventor if only I could remember his name. The tube should be short—just into the cavity, and no more.

I have not used hydraulic drainage in empyema; but from my experience of that method in bladder cases I would not be disposed to adopt it for empyema except in bilateral cases.

In meta-pneumonic cases the prognosis is most favourable, if only drainage has been adopted early enough. In cases of tuberculosis of the pleura the prognosis is bad.

Finally, with regard to thoracoplasty, three types of operation have been adopted:—

1. Removal of the ribs over the whole area of the empyema so as to permit the chest wall to fall in towards the lung. My experience of this operation is unsatisfactory. The thickened parietal and visceral pleura is a great obstacle to the obliteration of the cavity.

2. *Schede's operation.*—Removal of the ribs, the intercostal

structures and the parietal pleura: an operation the severity of which can, however, be somewhat diminished by doing only part of the cavity at a time.

3. Removal of the parietal and visceral layers of the pleura: an operation of exceptional severity and uncertainty.

There are certain difficulties common to all these operations.

The condition of the patient is one most unfavourable for the necessary constitutional strain. Resection of the upper part of the chest wall is always dangerous and sometimes impracticable. In many of these cases the local tubercular mischief cannot be completely removed.

To epitomise, I would say:—

1. Given *early* drainage and even moderate care in the after treatment, many cases of empyema will get well.

2. With pitiably few exceptions, tubercular empyema will not get well in spite of the most careful treatment.

3. For neglected empyemata of non-tubercular type Schede's operation, or some modification of it, offers a substantial hope of cure.

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Dr. A. C. O'Sullivan gave particulars of the opsonic power of the blood and pus from two cases of empyema.

Dr. Hayes showed four cases illustrating the good effects after operation done up to ten years previously. He pointed out that formerly irrigation was always carried out, but this was never done now. He relied on puncture with a long needle as the best aid to diagnosis, and thought that the severe operation recommended by Sir Arthur Chance was unnecessary, as his cases showed that the thickened pleura had resolved.

Dr. Ninian Falkiner submitted from the Registrar-General's statistics the following tabular statement of the ages of those whose death had been attributed to empyema in 1904, and of the associated conditions:—

TABLES I. and II. showing, for the year 1904, by age-periods, the diseases with which the deaths directly attributed to Empyema of 35 persons (29 males and 6 females) were associated.

I.—DISEASES (BY AGE-PERIODS) WITH WHICH 29 DEATHS OF MALES FROM EMPYEMA WERE ASSOCIATED.

| | Total Deaths | Ages at Death | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Under 1 year | 1 | 2 | 3 | 4 | Under 5 years | 5– | 10– | 15– | 20– | 25– | 35– | 45– | 55– | 65– | 75– | 85– | 95 and upwards |
| Broncho-pneumonia .. .. | 1 | .. | 1 | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Tubercular Phthisis .. .. | 4 | .. | .. | .. | 1 | .. | 1 | .. | 1 | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. |
| Tubercle of other Organs .. .. | 13 | .. | .. | .. | .. | .. | .. | .. | 1 | 5 | 4 | 1 | 1 | 1 | .. | .. | .. | .. | .. |
| Pleurisy .. .. .. | 4 | .. | .. | .. | .. | .. | .. | 1 | .. | .. | 1 | .. | 1 | .. | .. | .. | 1 | .. | .. |
| Appendicitis .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. |
| Not ascertained .. .. .. | 6 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | 1 | 3 | .. | .. | .. | .. |

II.—DISEASES (BY AGE-PERIODS) WITH WHICH 6 DEATHS OF FEMALES FROM EMPYEMA WERE ASSOCIATED.

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tubercular Phthisis .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Tubercle of other Organs .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | .. |
| Pleurisy .. .. .. .. | 1 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | .. | .. | .. |
| Not ascertained .. .. .. | 2 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. |

From above Tables it appears that of 35 deaths which were directly attributed to empyema, 20 were upon further inquiry found to be connected with tuberculous disease, 5 with pleurisy, one with broncho-pneumonia, and one followed acute appendicitis. Regarding 8 deaths from empyema, no further information was obtained.

# CASE OF CIRRHOSIS OF THE LIVER TREATED BY OPERATION.

By H. C. DRURY, M.D., F.R.C.P.I.;
Physician, Sir Patrick Dun's Hospital.

[Read in the Section of Medicine, March 2, 1906.]

J. Q., aged thirty-three years, was referred to me one morning in the accident room of Sir P. Dun's Hospital, as he was complaining of hoarseness. His throat was very red, but there was nothing more to be made out, nor was anything else complained of. About a week after Dr. E. H. Taylor saw him, as he was complaining of his abdomen being swollen. Dr. Taylor found that he had ascites, and handed him over to me. He was admitted at once—*i.e.*, on October 10, 1905. He was a fine, healthy-looking man, 15 stone weight, without any appearance of being addicted to over-indulgence in alcohol. He confessed that he frequently drank a pint or two of stout, but denied that he was a heavy drinker. This I subsequently confirmed by independent testimony, it being stated to me that he was a steady, hard-working and well-living man.

One makes these inquiries, one enters such notes, though recognising that they are of little importance, for it is undoubted that many cases of true annular cirrhosis of the liver are not due to alcoholic indulgence, and it will be allowed that the majority of cases of alcoholic over-indulgence do not get hepatic cirrhosis. Still the term alcoholic cirrhosis, and other equally suggestive terms, are so frequently used that it is hard to dissociate from one's mind the ideas of alcoholism and cirrhosis.

On examination it was easily evident that he had a very large and well-marked ascites, the abdominal walls being distended and tense, the umbilicus everted. There was no jaundice at this or any other time. There were extensive varicose veins

in both legs, with slight ulceration. There was great œdema of the legs, which extended up to the thighs and sacrum, and was, therefore, not altogether due to the varicose veins. The heart was normal, the sounds being strong, regular and healthy, beating from 80 to 90 per minute. The lungs were healthy. His appetite was good; there had been neither vomiting nor pain. The bowels moved regularly, though we increased this with doses of saline laxative. The motions were normal in appearance, and did not contain any blood. The urine was very scanty, high-coloured—sp. gr. 1022 to 1035—with great deposit of lithates, no sugar; on one occasion only a faint trace of albumen; and under the microscope were found a few blood corpuscles and some epithelial cells. During the first twenty-four hours in hospital he only passed 8 ounces of urine; during the second twenty-four hours, 3 ounces of urine; and for the third day, 10 ounces of urine. He was positive that the abdomen had become swollen, as we saw it, in one week. This I could hardly credit, but supposed that, though it had been gradually enlarging for a considerable time, he had only recently noticed it. As a test of this I asked if he wore a belt. He answered that he did, and that it was only within the past week that he had required to let it out—first one hole, then a second hole. The belt was not forthcoming, having been left at home. It was brought next day by his wife, and we found the holes were one inch apart so it had been let out two inches. Fitting it now on the patient, at the position he usually wore it, it was found that it would not meet at all, the ends being between two and three inches apart. On account of the tense distension of the abdominal walls nothing could be noted of the condition of the organs within. As so little urine was being excreted, and to help in making a diagnosis, I asked Dr. Taylor to tap the abdomen. He did so on the fourth day, and 16 pints of fluid were withdrawn. This was clear, pale yellow, highly albuminous, forming a light, soft clot. After tapping, the urine increased in quantity, but not to the extent one might have expected had the diminution been due to pressure caused merely by ascitic distension. The day before the quantity was 10 ounces; the same day it was 14 ounces; and the day after 22 ounces; but then it began to diminish again, there being only 19, 20, 12, 8, and 13 ounces on the succeeding days.

Immediately after draining the peritoneal cavity as much as possible, the abdomen was carefully examined. The liver dulness was mapped out as extending a hand's breadth below the margin of the ribs in the nipple line. No enlargement of the spleen could be made out, and no tumour could be felt. These observations were confirmed at the time by my friend, Dr. R. H. Kennan, who happened to be present. On account of the fairly authenticated rapid appearance and increase of ascites within a week, the œdema of the legs and back, the great suppression of urine (in one day only ℥iii passed), the absence of any sign of heart, lung, or kidney disease, and the enlargement of the liver, the question arose of the possibility that the effusion was due, not to cirrhosis, but to the presence of a tumour about the region of the head of the pancreas pressing on the portal vein, thus causing ascites, and also pressing on the inferior vena-cava, and producing venous congestion of the kidneys, with suppression of urine and œdema of the lower parts of the trunk. This it will be seen was not the case. It should be mentioned that during the few days under observation numerous small nævi made their appearance on patient's face, neck, arms and hands—these consisted of a central small raised red papule about the size of a millet seed, with a zone of minute bright red vessels radiating out from each. At first only three or four of these were seen on the face, and one on the wrist, but within a few days (four or five) there were twenty or thirty of them scattered over the limbs and trunk. Many of these have now disappeared, but some remain. After the tapping operation on October 13 the abdomen rapidly filled again, and the fluid kept on oozing through the trocar wound. The abdomen, within two or three days, was as full as ever, so I obtained the patient's consent to a further operation, and asked Dr. Taylor to make an exploratory opening, find out if there was a tumour, if not, or if it was not removable, do a Talma's operation to bring about a relief of the portal congestion through the systemic veins. Consequently, on October 20, Dr. Taylor operated. I was present and saw an enlarged cirrhotic liver. Dr. Taylor, at my request, carefully explored various regions, but found no tumour; the spleen was but slightly enlarged. At first Dr. Taylor said it was not enlarged, but on more careful palpation considered it was somewhat enlarged. The liver was

deep indigo blue in colour, and its surface extremely closely covered with very small and irregular elevations, not at all what one associates with ordinary cirrhosis. Dr. Taylor then proceeded with the Talma's operation. The patient made a splendid recovery. At first there was some distension of the abdomen, probably due to further ascites, but it never was of great amount, and very soon subsided. About ten days after the operation he had for four days a pretty profuse diarrhœa, but it caused him no inconvenience, and he said he felt relieved by it. Three days after operation the amount of urine passed was 40 ounces, and it gradually increased in amount till the seventeenth day, when it reached 58 ounces, after which we ceased to keep a record. It was thought that a distinct increase in the network of veins on the surface of the trunk was manifest. From the appearance now this does not seem so certain. Thirty days after the operation (Nov. 24), he left hospital for the convalescent home, where he remained till early in December, and we now present him for examination, he having returned to his work on Dec. 14, feeling quite well. When leaving hospital his weight was 10st. 8lbs.

The case is interesting, from a medical point of view, on account of the rapid appearance of ascites, with œdema of the legs and suppression of urine from a cirrhosis of the liver, which had not at all reached the atrophic stage; in fact, the liver was enlarged.

Œdema of the legs, though not uncommon in cirrhosis of the liver, cannot be said to be common, a least until a late stage in the disease. It sometimes, however, precedes ascites. Some say this is rare. Silvestri (*Rif. Med.*, Oct. 7, 1905), on the contrary, says it is common, putting it, in his experience, as high as 75 per cent. of the cases, and points out that in these there is no evidence of failing heart. His explanation is that the portal obstruction in the liver causes the blood to be diverted into anastomosing channels which so raises the blood pressure in the inferior vena-cava and common iliac veins.

Hale-White does not favour this theory nor yet that

which attributes the œdema to pressure on the vena-cava, but rather looks on it as due to some auto-intoxication analogous to that in nephritis. He, indeed, points out that the ascites itself is due to something more than mere portal obstruction, for in many cases of extreme cirrhosis there is no ascites, and he and Starling found that in dogs the portal vein could be firmly ligatured without producing ascites. On the other hand, there is commonly found to be some evidence of chronic peritonitis in cases of ascites with cirrhosis of the liver. Auscher also considers that peritoneal lesions are an undoubted cause of ascites in cirrhosis of liver.

The case has further interest from the result of surgical interference. There is no doubt of the improvement, which is manifest to all. The theory upon which the operation is founded is that the ascites is due to portal obstruction, and that by increasing the anastomosis between the portal and systemic veins this obstruction is relieved. The result tends to support this older theory, and also the theory that the œdema of the legs is due to direct pressure of the ascites on the vena-cava. Had the ascites depended rather on a chronic peritonitis the operation would have tended rather to increase this, for considerable intentional irritation of both visceral and parietal peritoneum was caused to bring about adhesion of these and promote new vessel formation.

The case then presents various points of interest, not only as to the diagnosis, but as to the explanation to be put on the symptoms and on the results of the operation.

# A CASE OF ANÆMIA SPLENICA INFANTUM.

By T. GILLMAN MOORHEAD, M.D., F.R.C.P.I.;
Physician to the Royal City of Dublin Hospital.

[Read in the Section of Medicine, March 2, 1906.]

THE condition to which the name anæmia splenica infantum is applied or, as von Jaksch termed it, anæmia pseudo-leukæmica infantum, is not one of very unusual rarity, but as its exact relationship to other anæmias of infantile and adult life is still a matter of discussion, it seems advisable to report any cases in which full blood examinations have been made during life and in which a subsequent pathological examination has been possible.

The disease, as usually met with, is characterised by great splenic hypertrophy, slight liver enlargement, pronounced anæmia, and considerable leucocytosis, all occurring in a child of from six to thirty months of age. Variations in type and degree are, of course, met with, and much difference of opinion exists as to what classes of cases should be included in, and what excluded from, the group, and still more as to whether the disease should be recognised as a distinct clinical entity at all or not. To these points we may, however, return subsequently. The notes of the case are as follow:—

P. G., a boy, aged three years, was admitted to hospital on the 28th of August, 1905, with the following history:—He was the fourth and youngest child of the family, of which the two elder members, aged seven and five years, respectively, were alive and healthy. The third child, a boy, had died of convulsions when a few months old. The father had died a month before the birth

of the patient of phthisis, from which the former had been suffering for over a year. The mother, aged thirty-two, was a strong, healthy-looking woman who denied having ever had any sickness of any kind since childhood. A full examination of her did not reveal any tubercular or syphilitic taint. She stated that the patient had been perfectly well until a year old, but that since that time he had gradually become more and more pale. When two years old he had an attack of measles, for which he was treated in hospital, and a few months after this sickness she observed that his abdomen was becoming swollen, and also that there was some swelling of the feet and lower eyelids. At the same time he became very weak and unable to support his own weight in the upright position. On admission the child was seen to be of a uniform pallid appearance, practically no tinge of colour being visible in the conjunctiva or mucous membranes. The anterior fontanelle had not quite closed, and was slightly depressed. There was no evidence of cranio-tabes and no bossing of the cranial bones. All the milk teeth were present and well formed, but the gums were spongy and bleeding. The cervical and axillary lymph glands were slightly enlarged, but the inguinal glands were apparently of normal size. There was slight rickety beading at the junction of the ribs and costal cartilages, and also some thickening of the bones of the wrists and ankles. The lungs and heart were quite normal. The abdomen was enormously distended, with protrusion of the umbilicus and slightly distended parietal veins. On the left side the spleen could be felt with ease, forming a large tumour which extended downwards as far as Poupart's ligament and forwards as far as the umbilicus. It was apparently not tender on pressure, and no rub could be heard over it on auscultation. The liver also was enlarged, extending down nearly to the level of the umbilicus, and a small amount of ascitic fluid was detected. Temperature normal; weight, 1 stone 5 lbs.; urine contained a little albumen, but no casts.

*Blood Examination.*—The red cells numbered 1,984,000 per c.m. They showed great variation in size, with marked poikilocytosis and polychromatophilia. Nucleated cells, mostly of normal size, but many with divided nuclei, were present in the proportion of 1 per 2,000 normal cells; hæmoglobin 52 per cent.

The white cells numbered 9,660 per c.m., and gave the following differential count :—

| | | |
|---|---|---|
| Lymphocytes | - | 40 per cent. |
| Hyaline cells | - | 15 per cent. |
| Eosinophile cells | - | 2 per cent. |
| Neutrophile cells | - | 42.5 per cent. |
| Basophile cells | - | .5 per cent. |

A few granular myelocytes were constantly present, and a large proportion of the neutrophile cells contained a horse-shoe or transitional nucleus. Most of the lymphocytes belonged to the large lymphocyte class. The treatment adopted was the exhibition of iron and arsenic, with cod liver oil, an abundant proteid diet, and bone marrow. For a time, also, small doses of grey powder were given, but this was discontinued owing to the onset of diarrhœa. The appetite was extremely good—indeed, somewhat voracious—and the child apparently steadily improved for three weeks, the spleen getting smaller and the weight increasing slightly. At the same time, however, the number of red cells steadily diminished to a little over a million per c.m. After three weeks the temperature rose to 101° F., and from that on till the child's death, eight weeks later, never again settled down steadily. During this time the size of the liver varied considerably, at times extending below the umbilicus and again retracting up almost under the ribs. The spleen on the whole became smaller and ultimately somewhat tender on pressure. A mitral and pulmonary systolic murmur also gradually developed, and the apex beat became displaced outwards to the anterior axillary line. No important blood alteration took place ; the red cells sank to about 1,000,000 per c.m., but the white cells remained at about 10,000 per c.m., with an average of 50 per cent. of the non-granular cells. Some increase in myelocytes and nucleated red cells was also noticed, and the hæmoglobin fell to 40 per cent. X-ray treatment was carried out by Dr. C. M. Benson, who exposed the child altogether on fourteen occasions, for ten minutes at a time, the rays being directed upon the spleen. No apparent good effect was, however, produced, and nothing else of note was observed till the 29th of October, when the temperature began to fluctuate widely; some crepitus was heard at the base of the left lung; the child became

very peevish and irritable, and finally died quite suddenly on November 2nd.

*Autopsy.*—The heart was unusually large for the age of the child, but the valves were quite healthy. The walls were pale, but proved normal on microscopical examination. All the chambers were dilated, especially the left ventricle, which showed an extreme degree of widening. The lungs presented some œdema at the bases and also a few broncho-pneumonic patches. Small sub-pleural hæmorrhages were present, scattered over the surface of both lungs. The bronchial and anterior mediastinal lymph glands were enlarged and of a deep red colour. The thymus gland was small and atrophic. The spleen was firm and hard, and of a deep red colour on section. Its capsule was thickened here and there, and the phrenico-colic ligament was stretched out as a thin band along its outer surface. The Malpighian corpuscles did not show clearly. The liver was considerably enlarged, was very pale in colour, and apparently fatty. The kidneys presented a number of subcapsular hæmorrhages, and also showed multiple small hæmorrhagic infarcts, while the entire pelvis of each kidney was filled up with one large blood clot, which extended a little distance down the ureter. The intestines were very anæmic, and showed enlargement of the agminated and solitary follicles. The pancreas and suprarenals were normal. The abdominal lymph glands were divisible into two groups—the first, the mesenteric glands, which were white and cheesy on section, and evidently tubercular; the second group comprising the aortic and iliac glands, and also those along the upper margin of the pancreas and along the lesser curvature of the stomach. These were all greatly enlarged and of a deep red colour, resembling in macroscopic appearance pieces of spleen tissue more than anything else. They formed very striking objects within the abdominal cavity, and appeared to be not only greatly increased in size, but also in number. The glands of the inguinal and axillary regions presented a somewhat similar appearance, but were not so large.

### MICROSCOPICAL EXAMINATION.

*Spleen.*—The capsule was considerably thickened, and numerous fibrous and hyaline trabeculæ passed from it into the

spleen pulp, which latter exhibited marked fibrosis. The Malpighian corpuscles were small, and the large majority of them were replaced by nodules of hyaline material, which had apparently spread out from the wall of the central artery. The endothelial cells of these vessels were in many places proliferated, and occluded the lumen. The pulp spaces were densely packed with red blood corpuscles, including, as would be expected, some normoblasts. A few eosinophile cells were found scattered in groups here and there, but no basophiles or megaloblasts were seen. The whole organ presented in fact the appearance of chronic fibrosis. There was no sign of tuberculosis. The *liver* showed some fatty change (degeneration) here and there throughout its substance, but not in great abundance. In most of the portal systems surrounding the vessels were groups of lymphoid cells, and occasionally distinct adenoid nodules. No other form of leucocyte was found, except for an occasional granular cell within the capillaries. Many of the blood vessels had thickened and hyaline walls. The cheesy-looking mesenteric *lymph glands* proved, as was expected, to be tubercular, and a few scattered tubercles were also found in some of the other glands. Most of the latter dark red glands, however, presented an appearance similar to what was found in the spleen—*i.e.*, there was diffuse fibrosis, with here and there strands of hyaline material, and the blood vessels were thickened and hyaline; the endothelial cells of the stroma had undergone a great amount of proliferation. In the looser parts of the tissue groups of eosinophile cells were found, ten or twelve in number, some of which were mononuclear, and a few normoblasts were also observed. The *kidneys* presented nothing abnormal with the exception of the infarcts and hæmorrhage already referred to, and slightly marked arteriosclerosis. The *pancreas, adrenals, thyroid gland,* and *myocardium* were normal. The Peyer's patches presented the appearance of general hyperplasia, and the lungs, as before stated, were bronchopneumonic and congested in parts. Many of the organs were stained for micro-organisms, but with negative results. The *bone marrow* of the femur and tibia was studied, and appeared normal, the mononuclear cells largely predominating. No abnormal forms of red cells were found.

The case is, I think, obviously an example of the disease

described by von Jaksch, presenting as it does the evidence of mild rickets and the characteristically large number of normoblasts within the blood. The tuberculosis of the abdominal lymph glands must be regarded as a secondary infection, though apparently an unusual one, inasmuch as I have been unable to find any record of such an occurrence in any of the recorded cases which came to an autopsy. The condition of the non-tubercular glands is interesting, and conforms in the bright red colour and in their enlargement to what has been previously noted by some observers, notably Hunt and Telling. The latter observer says that the glands in his case had undergone a complete myeloid transformation, but from the literature this must be very rare, and was certainly not present in my case. The splenic change was in every way typical, except that oxyphile cells were scanty in the pulp. This is, however, common enough, and indeed the reported cases might almost be divided into two groups, according as these cells are or are not present in abundance throughout the body. The symptoms, however, appear to be the same in all cases.

A hæmorrhagic tendency is generally present in a more or less marked degree, although Hutchison, who has had an extensive experience, denies the fact. Extensive hæmorrhage is, however, rare, and I have found only one other case, that of Hunt, in which kidney hæmorrhages took place. In that case also the bleeding was found only *post mortem*. The absence of leucocytosis does not appear to have any special significance, as counts as low as 1,800 per c.m. have been recorded.

Since the name was first applied to the disease an enormous number of cases have been reported, and the most diverse views have been put forward with reference to its causation and to its relation to the adult anæmias. It seems to be pretty generally agreed that it is identical

neither with splenic anæmia of adults nor with any of the varieties of leukæmia, and most authors regard it now as a disease *sui generis*. There still exists, however, much evidence to favour the view that it is really a secondary anæmia, and may be produced by any cause of cachexia, such as rickets, congenital syphilis, or chronic gastro-intestinal catarrh. Into this vexed question I will not enter further than to say that in the present instance there was no evidence either of syphilis or of catarrh, and that the rickets was apparently of a very mild type. If rickets really has any influence in causing it, the disease should surely be much more common than it is, and should be found more often in the severer types of that affection. The clinical picture is certainly sufficiently striking and sufficiently constant to justify our regarding it as a distinct entity.

# A CASE OF UNRESOLVED PNEUMONIA TREATED BY PNEUMOCOCCUS VACCINE.

By JAMES B. COLEMAN, C.M.G., M.D., F.R.C.P.I.;
Physician to the Richmond, Whitworth and Hardwicke Hospitals; and to the Royal National Hospital for Consumption for Ireland.

[Read in the Section of Medicine, March 2, 1906.]

The patient, a labourer, aged fifty years was admitted to the Whitworth Hospital on 20th December, 1905, suffering from a very severe attack of acute croupous pneumonia, the onset of which had occurred six days previously.

On admission to hospital he was in a low typhoid state, his pulse ranging from 126 to 138; respirations, 44 to 48; and temperature, 102.6°. There was consolidation of upper and middle lobes of right lung. On 23rd December the consolidation had involved the lower lobe of the right lung, and on 26th December the lower lobe of the left lung was similarly affected. There was no critical fall of temperature, and, though the patient's condition somewhat improved, convalescence was very slow. On 4th January a painful inflammatory swelling developed in the left supraclavicular region; this subsided in three or four days. On 20th January there were dulness and tubular breathing over the entire right lung, with, in addition, crepitus over the lower lobe; the left lower lobe was dull on percussion. At this date, thirty-seven days after the onset of the disease, the patient's general condition was very unsatisfactory, and there was no sign of resolution in the lungs.

On 21st January the pneumococcus opsonic index was .60, and on 23rd it was .62, whilst the tubercle opsonic index was 1.

On 24th January he was inoculated with 46½ millions of pneumococci.

On 25th January pneumococcus opsonic index was .69. The inoculation was followed by no local or constitutional disturbance. Physical signs in patient's lungs were such as might be present in pneumonia of five or six days standing.

30th January.—Pneumococcus opsonic index 1.17.

31st January.—Patient looks and feels better. There is marked improvement in the physical signs in both lungs.

3rd February.—Pneumococcus opsonic index .89.

6th February.—Pneumococcus opsonic index .91.

8th February.—Left lung has cleared up. The only physical signs in the right lung are dulness and tubular breathing at the apex, and diminished resonance over the lower lobe.

9th February.—46½ millions of pneumococci injected.

12th February.—Pneumococcus opsonic index 1.13.

20th February.—Patient is in excellent health. He has increased in weight 8¾ lbs. since 1st February. Physical signs in lungs as on 8th February.

22nd February.—Pneumococcus opsonic index 1.09.

23rd February.—Pneumococcus opsonic index 1.06.

2nd March.—Pneumococcus opsonic index 1.07.

Dr. Coleman remarked that this was only a single case, and that it would not be fair to deduce too much from it; but the facts pointed to the favourable result being due to the injection of pneumococcus vaccine administered by Professor Wright's method. In conclusion, he expressed his great indebtedness to Professor A. C. O'Sullivan for having made and supplied him with the pneumococcus vaccine used.

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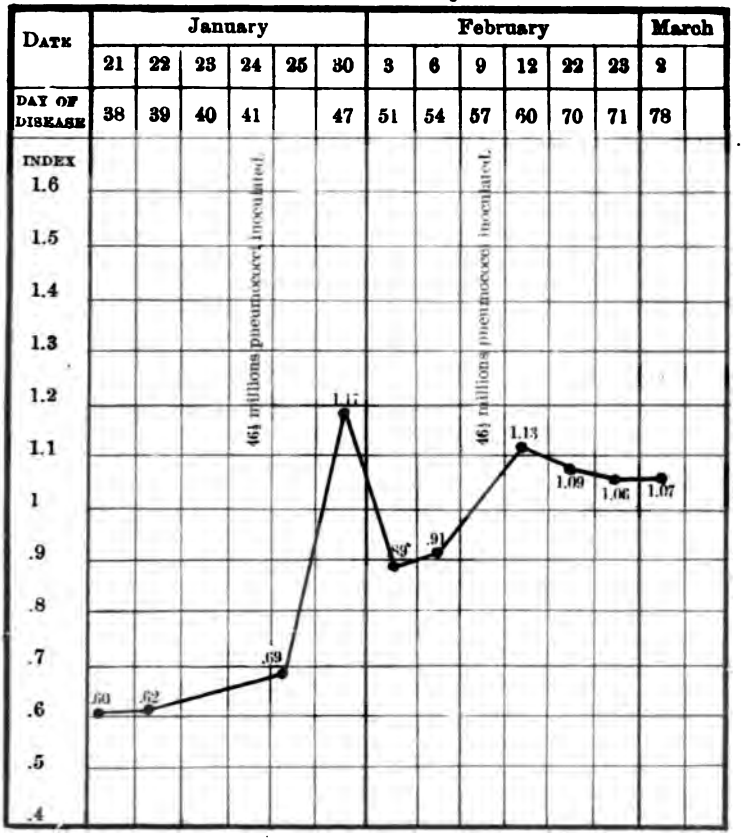
Dr. J. M. Finny expressed confidence in Dr. Wright's inoculation treatment.

Sir John Moore deprecated the treatment of pneumonic fever by antipyretics. He believed high fever, if not of too long duration, was followed by rapid resolution.

Dr. Coleman, in reply to Sir John Moore, said that the case was one of a very severe toxæmia, though without high fever. He also condemned the use of antipyretic drugs for fever. With regard to Dr. Moorhead's questions, he supposed the negative phase was not noted because it was very slight in degree and transient. He was surprised at the statement that such cases of unresolved pneumonia, even in old people, were of common occurrence. Considering the condition of his patient before inoculation, and the immediate improvement following the inoculation of the vaccine—the improvement being accompanied by a rise in the opsonic index—it seemed fair to attribute the good result to the vaccine.

## CHART OF PNEUMOCOCCUS OPSONIC INDEX.

*Name*—J. D. *Disease*—Acute Croupous Pneumonia.




### REMARKS.

14 Dec., 1905—Invasion.
20 Jan., 1906—Right lung, consolidation; left lung, lower lobe, consolidation.
21 ,, ,, Pneumococcus opsonic index = .60.
23 ,, ,, ,, ,, = .62.
24 ,, ,, Inoculated 46¼ pneumococci.
25 ,, ,, Pneumococcus opsonic index = .69; physical signs in both lungs resemble pneumococci of fifth or sixth day.
30 ,, ,, Great improvement in signs and symptoms.
,, ,, ,, Pneumococcus opsonic index = 1.17.
3 Feb. ,, ,, ,, = .89.
6 ,, ,, ,, ,, = .91.
9 ,, ,, 46¼ millions pneumococci inoculated.
12 ,, ,, Pneumococcus opsonic index = 1.18.
22 ,, ,, ,, ,, = 1.09.
23 ,, ,, ,, ,, = 1.06.
2 March ,, ,, ,, = 1.07.

# BRADYCARDIA, WITH ARRHYTHMIA AND EPILEPTIFORM SEIZURES.

By J. MAGEE FINNY, M.D. Dubl., F.R.C.P.I.;
Physician to Sir Patrick Dun's Hospital.

[Read in the Section of Medicine, March 30, 1906.]

Bradycardia—"Slowheart," or, as very properly insisted on by Gibson, "infrequent beating of the heart"—has of late years assumed a prominence in clinical medicine, and has awakened considerable physiological and pathological interest. The work of Gaskell[1] on the functions of the heart muscle may be considered to have revolutionised the older views of the neurogenic cardiac mechanism, as it transfers the stimulus of the cardiac muscles from the higher nerve centres through the vagi and the sympathetic nerves to the muscle of the heart itself. "The muscular fibres of the heart possess the power of rhythmically creating a stimulus, of being able to receive a stimulus, of responding to a stimulus by contracting, of conveying the stimulus from muscle fibre to muscle fibre, and of maintaining a certain ill-defined condition called tone" (Osler).

Many observers since then have detailed clinical cases based upon this theory—the "myogenic theory"—the more notable being Wenckebach, Jas. Mackenzie, Alfred Webster, George A. Gibson, and John Hay.

The term "heartblock" has been applied to the failure of an impulse, which has originated in the muscles of the auricles, to pass the auriculo-ventricular septum through the auriculo-ventricular bundle of His, and to stimulate a contraction in the muscles of the ventricle. In other words, the auricles contract regularly, but the ven-

tricles do not respond oftener than once in two, three, or four of such auricular contractions.

When the ventricular impulses and systoles are continuously out of rhythm with the auricular contractions the term "bradycardia" is applicable; the rate of the ventricular systoles and the radial pulsations being synchronous, though infrequent—say to 40, 30, or 20 in the minute. Should the ventricular systole be occasionally still further delayed, so that there may be a cessation of ventricular contractions for 3, 5, 10, or 15 seconds in a minute, the term of "arrhythmia" is applicable.

The following case exhibits bradycardia and arrhythmia, and, as a result of the latter, epileptiform attacks of varying severity, in one of which sudden death occurred: —

CASE.—Mrs. J. M'N., aged forty-two, married, was admitted to hospital on June 19th, 1905, under my care, on the recommendation of my colleague, Sir Arthur Macan, who had noticed the remarkable slowness or infrequency of her pulse—cir. 22 in the minute. She has three living children, and had had a fourth, born on April 27th, 1905, but he died of convulsions at the age of five weeks. Since her confinement, nine weeks before admission, she has had frequent "weak turns" or fits, and complains of weakness of her heart. She is unaware of her pulse rate being unusual. She has never had any other serious illness, and denies any syphilitic disease.

When questioned closely as to the fits, the patient states that she never had had any attack before April, 1904—*i.e.*, fourteen months before admission—and that she then suddenly fell and became unconscious; that this occurred three months before she became pregnant; that these attacks continued, at varying intervals, during pregnancy; they were not worse during parturition, nor while she was nursing her baby; but that after the death of the child they returned, and they have become much more frequent of late, she having had as many as twenty in one day last week.

I instituted inquiries at the maternity where she was con-

fined, but the only note made was that the case was a breech presentation; and no comment of any convulsions, cardiac infrequency, or ventricular arrhythmia. She herself says that her heart was not affected, as at present, until the death of her baby—that is, not until about a month before admission to hospital, and that she never asked advice on the subject, although Dr. Byrne, Medical Officer of Grand Canal Street Dispensary, was in attendance at her house on the baby, during its illness, and up to the day of its death.

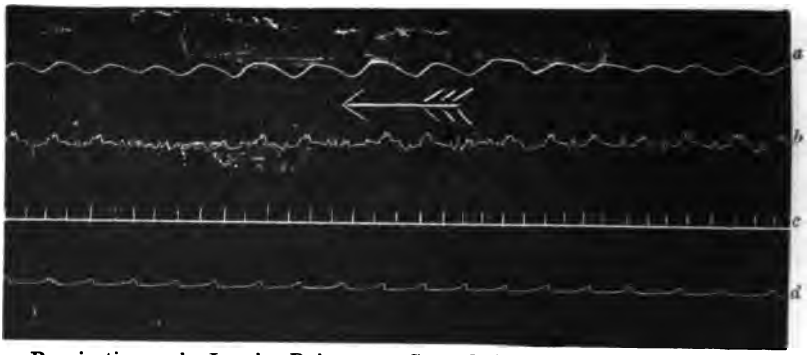
On admission the pulse was regular—20 to 24 in the minute—compressible and was unaccompanied by cyanosis, dyspnœa, or hurried respiration. There was no complaint made about the heart except a sensation, when a fit came on, of the heart beating forcibly. Subsequent observation did not confirm this idea, for rather the very opposite happened, as before a "fit" the heart's beat was still less frequent, and sometimes there was an absence of any impulse, or pulse at the wrist, for 5, 8, 10, or even 15 seconds; and as soon as the "fit" passed there was no excitement or tumultuous action of the organ.

The heart itself was slightly enlarged; the area of cardiac dulness extended from the left sternal line, at the level of the fourth rib, to the mammary line, and the impulse was under the nipple; a shade of dulness was present at the third left costo-sternal articulation and third space near it. The impulse and radial pulse were synchronous and, as a rule, regular; and when the pulse at the wrist was noted to be absent for five or ten seconds the ventricular systole and impulse were likewise absent. The impulse was abrupt, but never heaving or forcible, and did not give the impression of hypertrophy. A second wavy impulse could at times be seen and felt above the fourth rib, and was probably auricular. The first sound was loud, and could be heard up the whole of the sternum, somewhat prolonged, owing perhaps to its slow rate, and was at times droning in character and with an approach to a murmur. The second sound was sharp and, like the first, very "deliberate," and did not instantly follow the first; it was pure and fairly loud, the pulmonary element being more pronounced. Careful examination showed the cerebro-spinal, pulmonary, hepatic, digestive and

genito-urinary systems to be free from all organic disease, and menstruation had reappeared a month ago.

Two days after admission the jugular veins, at the root of the right side of the neck, were seen to beat two or three times for each ventricular systole. This phenomenon was present each day during the first two months of her stay in hospital, and could be readily noted and counted, as the rate of the pulse was so infrequent as 20 to 24 in the minute. If these venous pulsations were to be considered as due to auricular contractions, then the auricles were contracting three times the rate of the arterial pulse of the radial and the ventricular

FIG. 1.—Simultaneous Tracings from the Lung, Right Jugular Vein, and Radial Artery.




*a*. Respiration. *b*. Jugular Pulse. *c*. Seconds in Minute. *d*. Radial Pulse.

systoles, and radial pulsations occurred after intervals of three or four seconds between them and the auricular contractions.

This very interesting question was settled by the application of the X-rays; and on July 7th Dr. E. J. Watson, our Assistant Physician and X-rayist, kindly examined the patient's thorax with the screen. His report was "that the heart is situated very horizontally; the auricles can be seen beating between the ventricular pulsations; two beats of the auricle were counted between the beats of the ventricle. The auricles seem slightly enlarged."

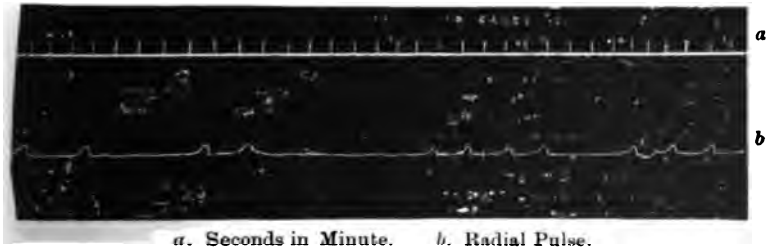
This is, I believe, the first recorded case where a prac-

tical ocular demonstration was made of the mechanism of this irregular pulsation in cases of bradycardia.

Professor W. H. Thompson most kindly took transmission tracings of the right radial, the jugular vein, and the respiration on July 21st. The venous pulsations can be readily seen to exceed those of the radial by two or three to one.

On June 28th the patient had a fit, and during it her face became flushed and her hands shook. It was noticed that just before the fit came on the pulse at the wrist had ceased.

Fig. 2.—Tracing from the Radial Artery with Arrhythmia and Syncopal Attack.




*a*. Seconds in Minute. *b*. Radial Pulse.

The sequence of the fit following the cessation, or arrhythmic contraction of the left ventricle, was not a matter of theory, for though it rarely happened that a fit came on while under examination, with the finger on the radial or the stethoscope over the heart, and though the vast majority of the fits were recorded by the nurses in charge or the clinical clerks after their onset and during their occurrence, still it did so happen that, on several occasions during the patient's stay in hospital, I myself verified the cessation of the ventricular systole and the radial pulse, and was able to call the attention of the class of students to an approaching fit when the intervals between the pulses extended to 5, 7 or 10 seconds. The house surgeon and clinical clerks confirmed this fact on many occasions. I was further fortunate in securing a sphygmographic tracing on July 21st, which Professor Thompson kindly took just at the very moment

of the occurrence of a specially long pause, the pulse-rate being about 26 to the minute.

It will be seen that the pause lasted about ten seconds, and at that moment the patient had a slight "fit"—that is, her face flushed, her eyes were turned up to the right, a slight tremor passed over her lips and fingers, and then she came to herself, looking a little frightened, and with a sort of sigh, while her eyes filled with tears.

It is not necessary, and it would be tedious, to give the notes of the daily observations. Each day was like the other as a general rule, and I shall, therefore, summarise the progress of the case.

From the day of admission, June 19th, to the end of the month the "bradycardia" was generally at the same rate, and varied little between 22 and 28—several observations being made each day—and on the 28th it touched 32 for one counting. In July the same was the record, though it was as low as 18 on the evening of the 1st and the morning of the 5th, and was 16 in the evening of the 17th.

It showed variations sometimes, but very rarely. For example, at my visit, 10 o'clock a.m. on the 23rd, I found the pulse, which was 25 at 7 a.m., beating regularly at 56, and then, in a minute or two, it fell to 22, and that evening it reached 58—the highest since admission. On the 24th it was 25 at 7 a.m., 21 at 9 a.m., 56 at 10 a.m., and 36 at 8 p.m.

The patient, who had been kept recumbent, was allowed to sit up in bed on and after the 28th, and seemingly this was not attended by harm, though the pulse-rate rose to 52 on the 28th and 54 on the 30th. Fish and eggs were given on the 31st, and on the 3rd of August she was allowed out of bed to sit in a chair, and to move about the ward. At the same time meat was added to her dietary. This extra dietary and change of posture seemed to have no other effect than to make the heart more regularly infrequent, and its rate for the fortnight following was between 24 and 20—the same whether lying down or sitting—and it fell to 18 on the evenings of the 9th and 11th, and to 16 on the 10th. From August until she left hospital on October 12th, the pulse

rate was much the same, while her general health and strength improved: she had had fewer of the slighter "weak turns," but no bad fits.

Naturally, an examination of the heart was being constantly and frequently made by myself, the house surgeon, the resident staff and my clinical clerks, and nothing different from what I have described above was noticeable until the 26th of July. On this day, between the ventricular contractions, which were 22 in the minute, four to six single sounds could be heard in the minute. These sounds were not accompanied by any pulse at the wrist. Their chief situation was over the right ventricle, at the fourth costal space in the left parasternal line, and they were faintly audible above the fourth rib. This observation was not again met with; but on the 29th and 30th of July the heart was noticed to beat between 52 and 56, regularly, and the pulse at the wrist agreed thereto; the first sound was of a deeper tone, and accompanied with almost a murmur.

On August 27th another and a new feature was noted by the house surgeon. On listening to the heart one sound was to be heard in addition to, and between, the regular heart sounds; the patient, while under observation, had a "weakness," and nine of these intermediary sounds were counted before the heart beat again, then nine sounds and again a heart beat, then six intermediary sounds, and these sounds gradually became fewer until only one was heard between the ordinary heart sounds.

I must now refer more fully to another feature of this case which I have incidentally recorded, and that is, the attacks of the so-called "fits." Of these there were three kinds, and though probably of the same nature they became spoken of as "weak turns," "slight fits," and "severe fits." The association of these nervous attacks with the marked arrhythmic retardation of the pulse was more than a matter of fancy. As the "weak turns" came on much more frequently than the others they were the commonest met with. Several occurred during my visits to the bedside, and while the stethoscope was being applied to the præcardium and the fingers to the pulse.

A "weak turn" was ushered in and preceded by a delay in the heart's beat and radial pulse. Thus, when a pause lasted seven to ten seconds the patient's face became pale, the eyes had a very pained and frightened look, and some little restlessness of the head and hands ensued; and it ended by a slight flushing of the cheeks, some tears in the eyes, and the patient would give a slight sigh, or little hem or cough, and the "weakness" would be over. The "slight fit" came on with a soreness or sharp feeling in the stomach and left side of the thorax, which would then extend up the right side of chest into the head and eyes. The pallor of the face would be more marked, the eyes would turn up to the right side, and the hands would fidget and the fingers catch at the sheets. The patient always came out of this fit in a more frightened and slightly dazed manner, and the eyes had a strained and somewhat blind look for some minutes. The "severe fit" was more distinctly epileptic with sudden onset, the patient falling back if sitting up in bed, great pallor, convulsive movements of hands and arms, and also slightly so of feet, unconsciousness for five to ten seconds, and then great flushing of the face, and the patient came out of it very confused, and she was dull and nervous the whole day following. She never bit her tongue or passed urine in these fits.

On July 2nd six fits occurred before noon; and at noon, as she was turning round in bed to take her dinner, she had a fit of unusual severity. The pulse stopped for ten seconds, she became dizzy and weak, her head fell down, the face flushed, and the limbs shook. Five minutes later another fit followed, of less severity, and three more fits occurred at intervals of a few minutes. The patient had twelve fits in the course of the day. She is quite unconscious in the attacks, but by her subsequent feelings could say if they were mild or severe—the latter being preceded by the gastric aura referred to.

I was never able, during her first sojourn in hospital, to take the pulse at the moment preceding or following one of these "severe fits."

The number of the "fits" of all kinds—for I look upon them as epileptic in nature, though in varying degrees of intensity—varied from day to day: six on July 1st, twelve on July 2nd, three on the 13th, several on the 6th, six on the 15th, and four on the 17th. All through July the patient considered herself very much better, as the attacks were of the mildest form—"weak turns." In the second week of August, however, the more severe fits returned, and the patient became more alarmed, as she was afraid to sit up or turn to the left, as she said these positions would induce a fit, and, for the same reason, if sitting up she dreaded lying back. I looked upon this apprehension, however, as probably nervous, inasmuch that when I induced her in my presence to do as I wished her, as to change of posture, she had no attack. Probably the cessation of the catamenial period was provocative of their recurrence, and of her increased nervous dread of them, as she had not been unwell since June.

The treatment which suggested itself to me at first was directed to combat the "fits," and I gave her bromide of potassium with iodide of potassium; and, from analogy with the good results derivable from the bromides in tachycardia (as Dr. Travers Smith[2] has shown), I hoped they might also command the bradycardia. But after a week's trial I discontinued it, as it tended rather to increase than diminish the heart attacks of bradycardia and arrhythmia, and the character of the pulse became more compressible, and the patient looked more depressed.

After further study of the case, and noting that the heart failure preceded the nervous attacks, and that in all probability the cardiac failure to drive the blood into the

cerebral capillaries was the cause of the epileptiform attacks, I gave the following prescription with good results, and this was taken without interruption till August 18th:—

℞ Tinct. Strophanthi
Liq. Strychninæ Hydrochl. āā ♏v.
Acidi Hydrochlor. dil. - ♏x.
Syrupi Limonis - - ʒi.
Aquæ ad - - - ℥i. Ft. dosis, mitte ℥x.
℥i. t. d. s.

After August 28th she took "Easton's Syrup" until she left the hospital on October 12th, 1905, and she continued the tonic off and on at home, always attributing good to its use. Subsequently she occasionally attended at the hospital, when she stated she was able for light domestic work and the care of her children, but was never able to do heavy housework.

The "weak turns" were still present, but she had had only two severe fits, so far as could be ascertained, between Oct., 1905, and Feb., 1906. At the time of her visits the pulse was still infrequent, but regular, and about 24 in the minute. Dr. Watson examined her on Feb. 25th by X-rays, and demonstrated that the heart beat regularly at 28, and that the remarkable want of agreement between the contraction of the auricles and of the ventricles, which had occurred in July, 1905, no longer existed, and there were as many contractions of the ventricles as there were contractions of the auricles. It was also noticeable that the jugular pulsations were very indistinct, and could not be well counted.

With the intention of making a series of observations on this point, and for the purpose of having fresh and extended sphygmographic tracings, so as to enable me to speak more accurately as to the nature and the fre-

quency of the epileptiform attacks, I re-admitted the woman to hospital on the 28th of February, 1906, six months after her first admission to hospital. The following notes were made by Mr. William Pearson, clinical clerk, to whom I am indebted for the accuracy of his report and for his graphic description. Owing to the terribly sudden and fatal termination by a syncopal attack on the sixth day after her re-admission I give the notes in full:—

The pulse, taken at the wrist, on March 1st at 10 a.m., was regular, full, of good tension, and numbered 26 beats to the minute. It corresponded with the frequency of the heart. The heart's impulse was seen to be widely diffused; its action was slow and deliberate in character, being first apparent over the auricular region to the left of the sternum, and gradually passing downwards, over the ventricles, to the position of the normal apex beat. This slow movement was reminiscent of a wave of peristalsis crossing along the bowel beneath a thin abdominal wall. The ventricular impulse was distinct and promised to make a good cardiograph tracing, such as Professor Thompson hoped to make in a day or two. Pulsations were to be seen in the root of the neck, apparently three for each ventricular beat. The urine was clear amber colour, acid in reaction, sp. gravity 1020, and it contained a faint trace of albumen, but no sugar. The patient asked for, and was given, permission to get up out of bed.

After her dinner, at 12 30, she was proceeding with a nurse from one ward to another, for the purpose of having her weight registered, when she suddenly—without warning or cry—collapsed on her knees, and fell to the ground in a heap. Her muscles were completely relaxed. The house surgeon, Dr. Powell, was instantly summoned, and found her lying deeply cyanosed, pulseless at the wrist, and showing no evidence of respiration, except one feeble gasp. He thought she was dead. He immediately injected mvii of liq. strychninæ and used artificial respiration, leaving her lying with a pillow under her head, and having hot bottles placed round her. She did not make any effort to respire for 4 minutes, and he would have given her up as dead, except that on auscultation the heart gave a feeble flutter.

Oxygen inhalations were tried also. After some time, the artificial respiration being persevered in, the heart began to beat feebly, and respiration, somewhat stertorous in character, was resumed. After seven minutes the pulse at the wrist became palpable, and numbered about 40 to the minute. She was now carried back to her bed, and when I saw her, 40 minutes later, she was still deeply unconscious, with the eyes turned up and the pupils most widely dilated. She then commenced to moan and cry. Her arms were folded across her chest in a tonic spasm, her body arched in opisthotonos, the face in trismus, and urine was passed under her; the tongue was slightly cut, although a gag had been employed from the moment this tonic spasm set in Chloroform inhalations calmed the convulsions, and under its use the pupils became small—to a pinhole size; the heart reached 56 to the minute, while the respirations assumed a modified Cheyne-Stokes respiration ("Biot's respiration"). The respiratory rhythm showed a period of 70 seconds duration, in which respirations occurred, followed by a period of 26 seconds of complete apnœa, but the onset and cessation of respiration were quite sudden—the first and last breaths taken being of equal amplitude with the others. The pulse gradually sank to 40. After an hour the knee-jerk and conjunctival reflex were obtainable, though the pupils were again widely dilated. At 2 30 p.m (that is, one hour and forty minutes from onset) the attack passed off, and the patient fell asleep. She awoke at 4 p.m., and was given 25 gr. brom. potass., and had three attacks of vomiting. Pulse and respirations were then noticed to be synchronous—viz., 28 in the minute.

The following morning (March 2nd) the patient was quite calm, but was totally oblivious of the entire of yesterday's attack, and, when asked, stated she had not got up at all, and was not sick in her stomach. Her pulse was regular, 36 in the wrist, and two tracings were made (Dudgeon's sphygmograph), one in the recumbent, the other in the sitting, posture. They are the same in frequency, and exhibit a sharp up-stroke, which is short, followed by a prolonged line of gradual descent, which shows faint vibrations.

March 3rd.—A complaint of headache in the right temporo-parietal region. The tongue was a little sore from the effects

of the fit of the 1st. The pulse was 22, and in a few minutes later it counted 32. It was weaker than usual, and somewhat irregular. Temperature, which had gone up to 99° on the 1st after the severe fit, had fallen to its usual subnormal standard of 97°. The tonic mixture of iron, quinine and strychnin, which was resumed on the 2nd, was continued, as the patient felt it did her good; and, though very anxious to be allowed up, it was thought safer to keep her in bed—much to her chagrin.

March 4th.—Two rather severe attacks occurred between midnight and 1 10 a.m., then several minor epileptiform attacks occurred this morning, and in the afternoon an almost continuous series of seizures. At noon, during a short attack, the heart beat 140 per minute for some time. At one period, towards the end of a fit, on auscultation, the usual infrequency of 24 beats were first heard, and suddenly it increased to about 150, and maintained this high rate for just 20 seconds, when it again suddenly fell to its usual 24. In the afternoon a severe seizure came on at 4 p.m., and lasted four and a quarter hours. Cries and shrieks were emitted, convulsive spasms and opisthotonos occurred, while at times strabismus and Cheyne-Stokes, or Biot's type of, respiration were present; the pupils were widely dilated. Chloroform was freely administered, and at times artificial respiration had to be employed. The whole attack, which fortunately occurred while she lay in bed, closely resembled the bad attack of the 1st instant, and death seemed momentarily imminent. The pulse at 2 p m. was 24, at 5 p.m it was 150, at 6 o'clock 22, and after the attack, at 10 p m., it was 32. The attack might be considered of a somewhat milder type, but it lasted much longer. It was succeeded by other shorter attacks at 9 p.m., 9 30, 10 30, and 11 p.m. Next day, March 5th, was marked for vomiting twice and six mild fits in the evening; the pulse at six observations being 26 to 32. Three fits occurred between 8 and 9 30 a.m. on the morning of the 6th, and in the last of these she died. The pulse at 2 and 6 a.m. being, as usual, about 28.

In the final syncopal attack of 9 30 every effort was made by the resident staff to restore life; and artificial respiration was kept up by the resident pupil, Mr. Gibbon, for

fully twenty minutes, but all to no purpose, as she never breathed. No sign of life returned, and she was practically dead the instant of its onset.

This sudden termination of life was not unexpected, as the alarming symptoms and cardiac failure of March 1st prepared us for the possibility of their recurrence and of death under these circumstances. Most unfortunately permission to make an autopsy could not be obtained, and thereby much pathological information has been lost.

### REMARKS.

Of the many interesting clinical features presented by the foregoing case the first and most striking is the infrequency of the pulse—so-called "bradycardia." This symptom is in itself not very uncommon, and every physician must occasionally meet with cases where the pulse-rate is slow, either temporarily or permanently. Indeed, during part of the time this patient was in hospital I had under my care two instances of this condition, though due to very diverse causes—one in a boy, aged six, who was unconscious, suffering from the pressure signs of tubercular meningitis, and the other in a man, aged seventy-two, presenting atheromatous arteries and fatty heart, in whom the pulse was 30 in the minute, and syncopal attacks not infrequently occurred. The bulk of the recorded cases of slowly beating hearts belong to this latter group, and it was in such conditions, occurring in old men, that Dr. Stokes[3] and Dr. Adams published cases of slowly beating hearts with paroxysmal syncopal or pseudo-apoplectic attacks—a group of symptoms now spoken of as the Stokes-Adams syndrome. It will be in the recollection of the Academy that last December Dr. Parsons[4] submitted a very full communication and recorded the clinical features of a typical example of this condition in

a male patient, aged sixty-eight years, who exhibited paroxysms of this symptom, with a pulse-rate of 30 to 40 in a minute, and who was afflicted with general arterio-sclerosis.

Thirteen cases of bradycardia are collected and reported by Dr. Alfred Webster,[5] in his valuable article on "Cardiac Arrhythmia in relation to Cerebral Anæmia and Epileptiform Crisis." Of these seven were over fifty years of age, and all except two were males; and the three cases which illustrated Dr. G. A. Gibson's paper[6] on the same subject were in males aged eighty, sixty-eight, and fifty, respectively.

The case of Mrs. M'N., which I have recorded, makes, then, a marked exception, in that the regular infrequency of pulse, at the rate of 22 in the minute, was present in a woman, aged forty-two, and who was free from all cardiac valvular, and arterial disease, and whose kidneys and other organs were apparently quite healthy. As her case does not come under the class of cases due to either senility, with myocardial degeneration, or to arterio-sclerosis, the cause, therefore, must be sought for elsewhere.

The second important feature of my case was the arrhythmia. The pulse-rate, as a rule, day by day and month by month was between 21 and 28, and, as can be seen by the sphygmogram [exhibited] taken during 120 seconds, it was perfectly regular. Yet at varying intervals the pulse became irregular, and a state of pulselessness—lasting 5, 8, 12, or 15 seconds—would occur without any cause or influence that could be explained, and which culminated in the terrible attacks of pulselessness (lasting seven minutes) which occurred a few days before death, and in the last of such cardiac arrests she died suddenly.

During the shorter cessations of the pulse, careful observations of the heart by stethoscope and hand failed to detect any ventricular contraction by sound or impulse, and the solitary sphygmogram Prof. Thompson was able to make during one of the attacks of arrhythmia shows an absence of pulse-wave for 4 seconds, and again for 10 seconds. (See Fig. 2.)

The idea of independent auricular contraction was forced on my mind by the observation that for every ventricular systole the jugular veins at the root of the neck beat three times. I do not wish to imply I made a discovery, but I found a novelty in my clinical experience which I was able to study at my leisure, and under peculiarly advantageous circumstances, for not only was the phenomenon constant day by day, but the rate of the pulse was always so slow or infrequent that it was easy to note these prominent features. This relatively want of synchronicity of the jugular pulsation and the heart's beat was not unknown to the great Stokes,[8] and was recorded by him as having come on in the course of one of his cases of fatty degeneration of the heart with pseudo-apoplectic attacks in a man aged sixty-eight.

Since his time many observers have recorded the same, although all do not take the same view as to its mechanism.

The tracing of the pulsation at the root of the neck, kindly made for me by Prof. Thompson, shows this condition graphically, and it can be readily observed that two or three elevations occur in the jugular tracing during the diastole of the ventricle. (See Fig. 1.)

In this connection I would again emphasise the most valuable and, as far as I know, unique confirmation in the fact

that the X-rays demonstrated a distinct double movement of the auricles for each ventricular movement—that is to say, there were three cardiac movements, in two of which the ventricles took no part. It also showed that both ventricles acted together, and that there was no "hemi-systole."

It is not my intention in this clinical record, even if it were in my power—which it certainly is not—to further discuss this most interesting and fascinating physiological and pathological subject, and I would refer to the works of Wenckebach,[10] Alfred Webster,[5] Mackenzie and Gibson,[6] with their series of pulse tracings and other evidences, to prove the reality of this cardiac arrhythmia. I would adopt the words of Dr. John Hay[11]—"Heartblock is no longer a theory; it is a fact, and has been recognised as such ever since Gaskell published his classical research on the contraction of cardiac muscle."

Of the many contributions to the literature of the subject that have lately appeared in the medical journals, one in particular struck me as so very remarkable that I cannot refrain from referring shortly to it. It is a paper by Henry Harford, of Nottingham, under the title of "Remarks on a case of Gummata of the Heart."[12] He bases his remarks on a case of a married woman, aged thirty-two, whose death occurred from heartblock after many attacks of long pauses, in each of which death seemed imminent; and a syphilitic gumma was discovered in the anterior wall of the right ventricle, involving the auriculo-ventricular septum. "The prominent symptoms were, on several occasions on many different days, that the heart was observed to beat 84 per minute for a variable time, and then to stop for 5 to 15 seconds. During this interval, on auscultation over the right heart and over

the pulmonary area, the auricles could be heard to continue beating. There was no second sound, no pulse could be felt at the wrist, and no cardiac impulse at the præcordia. The face became very pale; the patient had a slight convulsion affecting the face, arms, and legs; the eyes were turned upwards and to the left; a few inspirations (4 or 5) were taken, and the whole heart resumed regular and somewhat violent action." In one of these attacks the patient died.

In my case another and most interesting point in connection with the arrhythmia is suggested by the occurrence of the small sounds which have been heard in the intervals between the regular systolic ventricular contractions.

During most of these pauses perfect silence of all heart-sounds existed, and this was the rule. Yet, as I have recorded on a very few occasions one, two, or more distant sounds could be heard over the base of the heart; and these sounds were single sounds, not as if the heart sounds were re-duplicated.

These feeble distant sounds seemed to occur between the strong ventricular systolic sounds, to be unaccompanied by a pulsation over the ventricle, either the right or left, though sometimes a wavy pulsation could be seen above the fourth rib.

Three questions arise bearing on these sounds:—

1. Are the sounds due to a hemisystole of the heart—the right ventricle contracting while the left does not—a view hard to understand, though propounded by Sir Wm. Broadbent,[13] and supported by J. Seymour Maynard,[14] and accepted, with great reserve, by Wenckebach? On this point I give no opinion: but the theory gains no support—nay, rather is refuted by the observations made by the aid of the X-rays.

2. Are these sounds produced by the rhythmic contractions of the auricles, acting alone, and unaccompanied by ventricular contractions?—a view favoured by Wenckebach, and supported by G. Gibson's and Malet's observations.[9]

3. Can they be produced by feeble ventricular contractions which are not strong enough to empty the ventricular contents into the aorta in sufficient volume to cause the closure of the aortic valves and so produce a diastolic second sound?

The last feature of interest presented by my case is the occurrence of paroxysmal unconsciousness and epileptiform attacks. These attacks came on at irregular periods and in varying degrees of severity, sometimes several in a few hours—6 to 12 in a day—and, again, not for some days; and in severity they varied from a sudden pallor, followed by a flushing of the face, to slight convulsive movements of hands and legs, with the eyes turned up and fixed; and again, to a more severe type, which caused a fall and more general convulsion, lasted longer, and out of it the patient came to more slowly and feeling strange and frightened; and the last attacks were signalised by prolonged unconsciousness and coma, with absolute failure of heart, and sudden death.

The question presses—Were these earlier fits examples of epilepsia mitior (*petit mal*) occurring in a woman, in whom were present cardiac infrequency and cardiac arrhythmia, simply as a coincidence? or were the cardiac affection and the fits in direct relation to one another as cause and effect, and, if so, did the fits cause the cardiac phenomena, as claimed by Tripier, or *vice versa*?

When the patient came under my care I was at first inclined to think she was suffering from epilepsy, and

this opinion I based on her history—viz., that fourteen months before she had suddenly fallen in a fit, to which succeeded four others the same day; and that up to the day of admission to hospital she had had recurrence of fits. I accordingly gave her a course of treatment by the bromides, and had her under close observation. In a short time, however, I saw that the more likely connection between the fits and the slow pulse lay in the direction of the cardiac arrhythmia being the direct cause of the fits. Later on I could foretell by two or three seconds that a fit was imminent, and I was able to observe that the fits were due not simply to the infrequency of the pulse, for they did not occur even while the pulse-rate was as slow as 18 to 20 in the minute, but that they were sure to occur when arrhythmia occurred and when pauses of 8 to 10 to 15 seconds were noticed. It was the more prolonged cessation of circulation, and presumably the cerebral anæmia rather than venous stasis, which caused the syncopal and convulsive attacks.

That cerebral anæmia is a cause of convulsion is well known and daily verified, and the experimental work of Kussmaul and Tenner, by inducing cerebral anæmia and causing epileptic convulsions, is still uncontroverted.

For a full account of this subject in relation to arrhythmia I would again refer to the work of Dr. Alfred Webster. The conclusion he arrived at after analysing the clinical features of thirteen cases of slow pulse and epileptiform attacks, and after making many hundreds of observations and pulse tracings on his own case (included in the thirteen), seems to commend itself as the true explanation. "Our own experience,"[15] he writes, "tends to show a slow pulse, 18 to 24 in the minute, with even a moderate

degree of irregularity, is not associated with convulsions. For example, a pulse-rate of 20 in the minute, which means an asphyxial state of 3 seconds each, or even a pulse-rate of 12, which equals 5 seconds in each pause, is not enough, so long as it is fairly regular; but when the pulse is irregular, then convulsions will be induced."

Accepting these conclusions—to which many recorded cases of "heartblock" conform—I would say, therefore, the arrhythmia, and not simply the bradycardia, should be looked upon as the causal factor in the production of the convulsions.

When, however, we look for the cause of the arrhythmia we must acknowledge we are not much nearer its discovery, as the only point of agreement between various observers on the Continent and America, as well as in this country, seems to be the absence of any gross lesion by which the symptoms of Stokes-Adams syndrome might be accounted for, if we except arterio-sclerosis of the basilar artery and the circle of Willis, and of the vessels of the medulla. Granting these pathological changes to be the cause, how are they applicable in such a case as that of Mrs. M'N.?

I shall not, therefore, take up more of your time in discussing the many theories propounded to explain it; and in recording my case—devoid, as it unfortunately is, of the results of a *post-mortem* examination—I am sadly conscious I have added little to the ætiology, and nothing to the pathology of the condition. But if I have awakened an interest in the clinical record of a very unusual and rare case, and if the full details of its course to a fatal termination may stimulate others to a clearer conception and the unravelling of the mysteries attending bradycardia, I shall

feel my claim upon your patience and time has not been unwarranted or misplaced.

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# MYELOGENOUS LEUKÆMIA AND ITS TREATMENT.

By ALFRED R. PARSONS, M.D., F.R.C.P.;
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[Read in the Section of Medicine, March 30, 1906.]

A. B., aged thirty-eight years, a wardsman in an infirmary in the North-west of Ireland, was admitted to the Royal City of Dublin Hospital on the 8th September, 1905, complaining of a swelling in the abdomen, shortness of breath, and palpitation of the heart.

*Previous History.*—Eight years ago he had an attack of inflammation of the left kidney. Four years ago he suffered from cough, expectoration, and pain in the lower part of the right thorax, and was obliged to give up work for four weeks. He returned to work for three months, and was then again obliged to enter the infirmary as a patient for a period of four weeks. Subsequently he worked till February, 1903, when he was again obliged to lie up for a while. He returned to work on recovering, and continued to discharge his duties till a week before his admission to hospital. Briefly, then, during the past four years he has had three attacks, each of some weeks' duration, during which he suffered from cough and expectoration. It was feared that he had phthisis.

*Family History.*—His father is dead. His mother is alive and in good health. The patient is a widower, as his wife died of phthisis two years ago, having been ill for two years. He has five children, all of whom are well.

*History of Present Illness.*—One year and ten months ago his abdomen commenced to swell, and he suffered from attacks of abdominal pain, which were relieved by taking purgative medicine. The abdomen continued to increase in size, but gave him so little inconvenience, that he never mentioned the matter to the doctor who prescribed for his chest trouble. Towards the end of June, 1905, he observed that he was easily tired and that his breathing was short. The increasing weakness,

dyspnœa and abdominal swelling compelled him to consult Dr. S. Clarke, who was then acting as *locum tenens* for the visiting physician, Dr. Boyd, and he kindly sent the case to me.

CONDITION ON ADMISSION.

*Head and Neck.*—The patient is bald, of a sallow complexion, and the mucous membranes are somewhat anæmic. The tongue is not coated, and the teeth are, on the whole, good, but two molars and one bicuspid are lacking on each side in the upper jaw. The ears are rather prominent, pale, thin, and a little rough and irregular at the margin. There is considerable pulsation in the vessels of the neck, but no swelling of the glands can be made out by inspection or palpation. The thyroid is not enlarged.

*Thorax.*—The shoulders are a little too high, and the antero-posterior diameter rather deep. The chest is somewhat barrel-shaped. The circumference at the nipple level measures on inspiration thirty-nine, and on expiration thirty-seven and a half inches. The liver dulness does not begin till the seventh rib in the nipple line; the superficial cardiac dulness begins on the third rib. The note is generally tympanitic. Behind there is dulness on the left side from the level of the eighth rib downwards. On auscultation the breath sounds are normal in front, but over the base of each at the back there is crepitation. The heart sounds are normal, except that the aortic second sound is slightly accentuated. The axillary glands are very slightly enlarged; there was no tenderness on percussion over the sternum.

*Abdomen.*—The circumference at the costal margin was thirty-seven inches, and at the umbilicus thirty-four and a half inches. The whole of the left side is filled by a solid tumour, which extends three inches to the right of the umbilicus, and as low down as the anterior superior iliac spine. This mass is dull on percussion; the dulness begins on the sixth rib in the axillary line. Near the margin of the growth, and to its right, there is a tympanitic note. The edge of the swelling is firm and easily palpable through the abdominal wall. There is no evidence of ascites. The liver dulness extends one and a quarter inches below the costal margin in the nipple line, and its inferior free margin is palpable. The inguinal glands are also slightly enlarged.

*Lower Extremities.*—The femoral glands are as large as grains of shot. There is no œdema. The veins of the left leg, as far back as he can remember, are varicose.

*Urine.*—Reaction faintly acid, sp. gr. 1025. Albumen, .6 per cent. (Esbach) present; sugar, none; chlorides abundant; indican, present.

*Blood.*—Red blood corpuscles, 3,000,000; white blood corpuscles, 200,000; hæmoglobin, 55 per cent.

*Temperature, pulse, respirations* and *bowels.*—Practically normal.

This was the condition of the patient on his admission to hospital on the 8th September. He was discharged on the 14th March, having been six months under treatment. It will be possible to convey a better picture of the course of his illness by referring to certain points in the patient's case, and completing the description of each of these, rather than by a general account of his condition each week or month.

*The Blood.*—Considerable interest centres round the blood found in cases of leukæmia. Ehrlich and Lazarus have laid down the following characteristics for the blood in myelogenous leukæmia:—

(1) That in addition to the polynuclear cells their antecedents, the mononuclear granular leucocytes (Ehrlich's myelocytes), are found in the blood.

(2) That the participation of all three types of granular cells, the neutrophiles, eosinophiles, and mast cells contribute to the increase of the white blood cells.

(3) That atypical cell-forms—*e.g.*, dwarf forms of different kinds of white blood corpuscles—are found.

(4) That the blood invariably contains nucleated red blood corpuscles, often in large numbers.

The following table and diagrams, Nos. I. and II., will assist in following the changes which took place in the blood during the patient's stay in hospital:—

| | September | | October | | | | November | | | December | | | Jan. | February | | | | March | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 13 | 22 | 3 | 17 | 23 | 31 | 6 | 13 | 21 | 5 | 7 | 17 | 9 | 1 | 9 | 16 | 25 | 7 | 12 |
| Red blood cells | 3,000,000 | 3,070,000 | 3,215,000 | 3,200,000 | 2,500,000 | 3,600,000 | 3,200,000 | 3,600,000 | 2,220,000 | 2,440,000 | 1,840,000 | 2,450,000 | 2,440,000 | 2,564,000 | 3,620,000 | 3,160,000 | 3,744,000 | 3,620,000 | 4,160,000 |
| Hæmoglobin | 55 | — | — | — | — | — | — | — | — | — | — | 46 | 42 | 47 | 58 | 54 | 58 | 50 | 57 |
| White blood cells | 260,000 | 260,800 | 214,000 | 253,000 | 206,500 | 228,000 | 204,000 | 205,000 | ? | 86,500 | 67,000 | 104,000 | 73,000 | 15,500 | 16,000 | 14,500 | 12,500 | 6,000 | 8,000 |
| Differential Count in Percentages. Myelocytes (neutrophile) | 36 | 61 | 28.5 | 29 | 17 | 19 | 19 | 20 | 10 | 7.5 | 38 | 19 | 20 | 24 | 24 | 17 | 8 | 7 | 7 |
| Myelocytes (eosinophile) | 3 | 4 | 15 | 2.5 | — | — | — | — | — | — | 4 | — | — | — | — | — | 1 | — | — |
| Mast cells | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| Polynuclear (neutrophile) | 42 | 20 | 32 | 48 | 58 | 53 | 59 | 60.5 | 65 | 77 | 30 | 67 | 49 | 58 | 54 | 60 | 58 | 62 | 71 |
| Eosinophiles | 3 | 0 | 9 | 5 | 5.5 | 5.5 | 4.5 | 4 | 4 | 2 | 2 | 4 | 4 | 4 | 2 | 5 | 1 | 2 | 1 |
| Large hyaline | 10 | 10 | 8.5 | 8 | 14 | 16 | 7 | 10.5 | 16 | 9.5 | 14 | 6 | 10 | 8 | 16 | 9 | 18 | 5 | 11 |
| Lymphocytes | 4 | 5 | 7 | 10 | 3.5 | 6.5 | 9 | 6 | 5 | 4 | 10 | 5 | 15 | 6 | 4 | 8 | 14 | 22 | 10 |

| | September | | | October | | | November | | | | December | | | January | | | | | March | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [illegible] | 22 | 3 | 17 | | 31 | 6 | [illegible] | [illegible] | | 5 | 7 | [illegible] | [illegible] | 1 | [illegible] | 16 | [illegible] | 7 | 12 |
| [illegible] | [illegible] | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | [illegible] | [illegible] | 2,450,000 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | | [illegible] | [illegible] | | — | | — | — | | — | | [illegible] | 42 | 47 | 58 | 64 | 58 | 50 | 57 |
| White [illegible] | [illegible] | 768,800 | 214 | [illegible] | [illegible] | [illegible] | 20[illegible] | 20[illegible] | [illegible] | | 86,500 | 67[illegible] | [illegible] | [illegible] | 15,500 | [illegible] | 14,500 | 12,500 | 6,000 | 8,00[illegible] |
| [illegible] | 56 | | 8.5 | [illegible] | 17 | 1[illegible] | [illegible] | 20 | [illegible] | | [illegible] | 38 | 19 | [illegible] | [illegible] | 24 | 17 | [illegible] | 7 | 7 |
| [illegible] | [illegible] | [illegible] | 15 | 5 | — | | [illegible] | | — | | — | | — | — | — | | — | 1 | — | — |
| [illegible] | [illegible] | | — | | — | — | — | — | [illegible] | | — | — | | | — | | | — | 1 | — |
| [illegible] | 42 | | | | 58 | 53 | 5 | 60.5 | [illegible] | | | [illegible] | 67 | [illegible] | | 54 | 60 | 58 | 62 | 71 |
| [illegible] | 3 | [illegible] | 9 | | | [illegible] | 4.5 | [illegible] | [illegible] | | 2 | | 4 | [illegible] | 4 | [illegible] | 5 | 1 | 2 | 1 |
| Large [illegible] | | | 8.5 | 8 | | | | | | | 9.5 | [illegible] | | | [illegible] | 16 | [illegible] | 18 | 5 | 11 |
| Lymphocytes | 4 | | | 10 | [illegible] | 6.5 | [illegible] | | | | | | 5 | [illegible] | 6 | [illegible] | 8 | 14 | [illegible] | 10 |

Dr. Alfred R. Parsons—"Myelogenous Leukæmia."

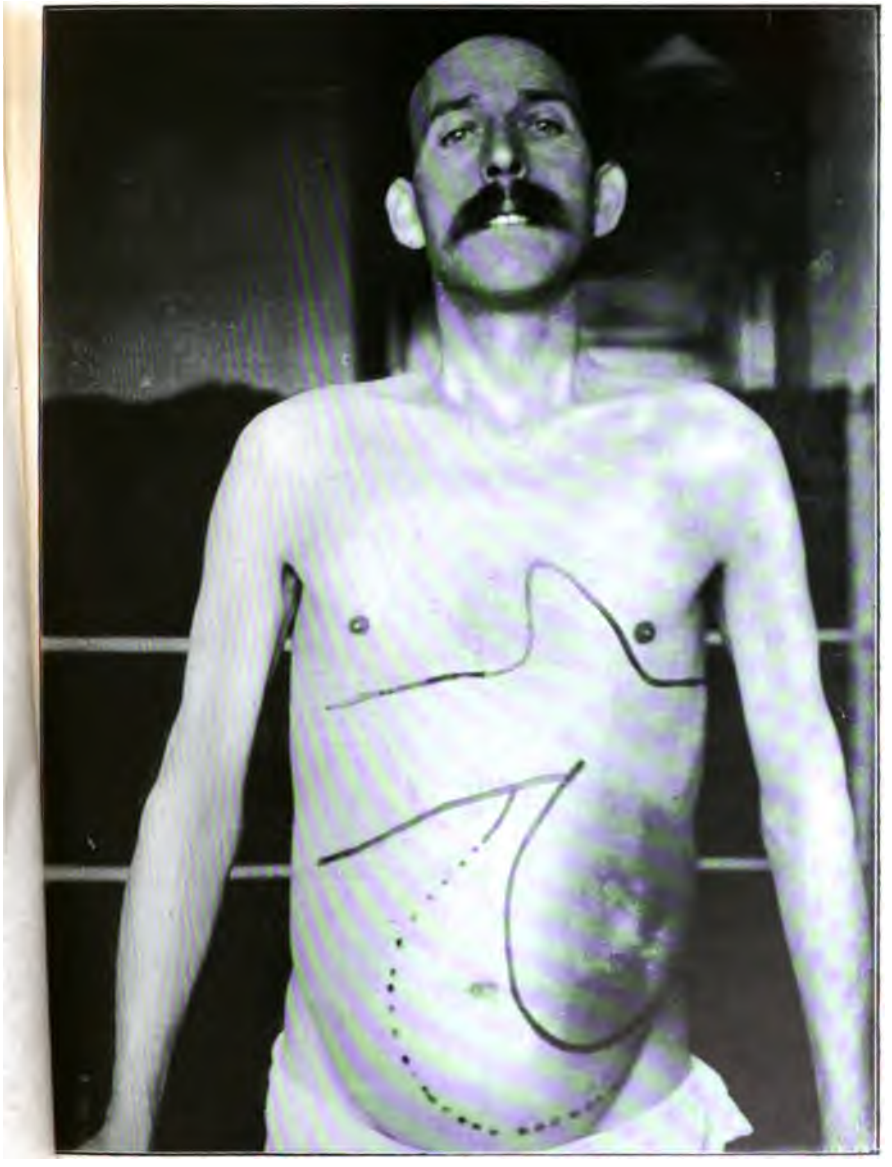


Illustration No. 1.—Size of spleen in September, 1905, and in January, 1906. Dermatitis produced by X-rays.

DR. ALFRED R. PARSONS—"Myelogenous Leukæmia."

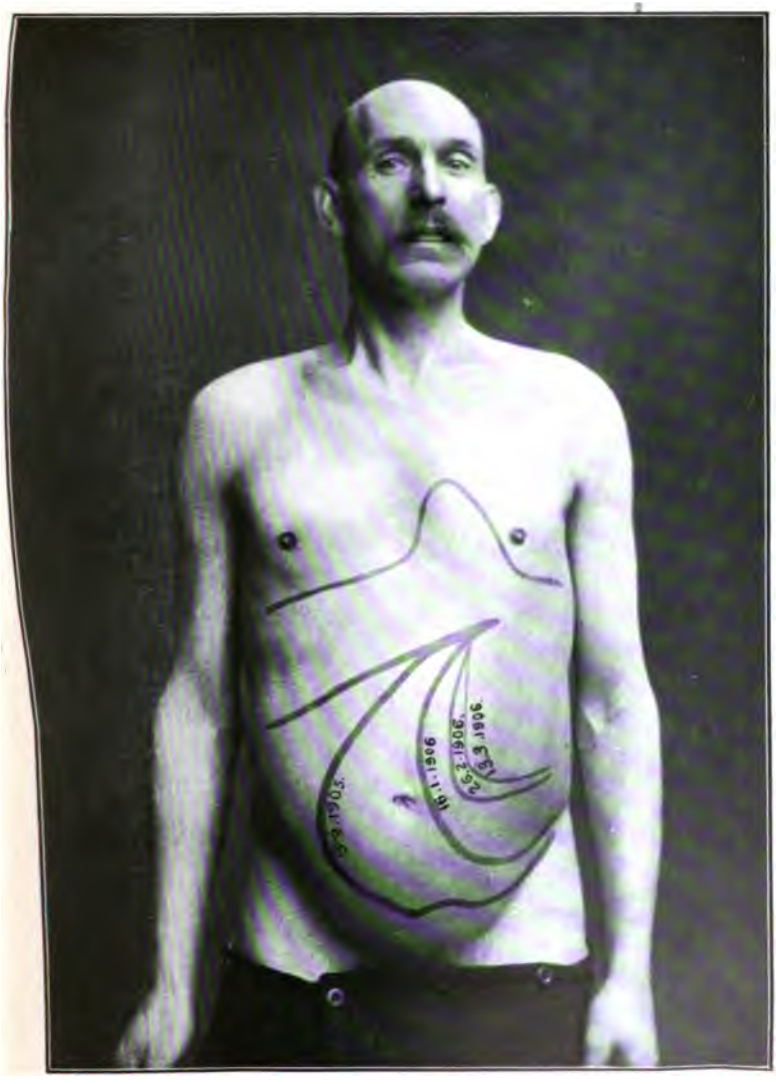



ILLUSTRATION No. 2.—Progressive diminution in size of spleen.

Nucleated red blood corpuscles were frequently present, but always in small numbers.

*Red Blood Cells.*—He had 3,000,000 per c.mm. on admission. A slight increase in the number was observed during the first two months, followed by a marked fall in December to 1,840,000. This fall was succeeded by a slow and steady improvement, so that just before he left hospital the count was 4,160,000. There were no abnormalities in the size, shape or staining properties of the red cells, except that occasionally a normoblast was found.

*Hæmoglobin.*—The hæmoglobin variations followed closely on the changes in the number of the red blood cells. The percentage on admission was 55 (Gowers). This amount fell to 42 per cent. early in January, and then an improvement took place, so that at the time of his discharge the percentage was 57.

*White Blood Cells.*—The leucocytes showed a remarkable alteration in their numbers. On the 22nd September they attained their maximal number of 260,800, which, when compared with 3,070,000 erythrocytes, gave a ratio of 1 to 11.7. For the following five weeks there was no remarkable variation in the total numbers. Then a striking drop took place, so that within a month the number fell from 205,000 to 67,000. A slight rebound then took place, which was followed by a subsidence to the normal, so that for the last few weeks the patient was in hospital his leucocytes may be considered as practically normal in number.

### DIFFERENTIAL COUNT OF LEUCOCYTES.

*The Polynuclear Neutrophiles.*—These cells under normal circumstances form 70 per cent. of the total leucocytes. On the 22nd September they had fallen to 20 per cent.; they then commenced to rise, and within two months, had become almost normal, and they were quite normal when he was discharged.

*The Myelocytes.*—The mononuclear neutrophile cells—the antecedents of the polynuclears—are practically never found normally in the circulating blood, though present in the bone marrow in great numbers. They constitute one of the chief features of myelæmia. They attained their maximum amount, 61 per cent., in the blood on the same day that the polynuclears were at the lowest, and, speaking generally, it will be noticed that as

the polynuclears increased to the normal the myelocytes diminished, so that they amounted to only 7 per cent. for the last fortnight the patient was under observation. The mononuclear eosinophile cells reached their maximum on 3rd October, and then, with three exceptions, were not observed in later counts.

*The Lymphocytes* show a lower relative percentage than normal nearly all through, on only one occasion rising to 22 per cent.

*The Hyaline Cells* remained fairly constant, averaging about 10 per cent.

*The Eosinophiles* showed a definite relative and a great actual increase during the earlier weeks under treatment. At the close they were normal.

*Mast Cells and Nucleated Red Blood Cells* were present in small numbers.

These percentages convey an idea of the relative proportions of the white blood cells, but the actual number of the different kinds of cells can be easily calculated when the total number of white blood cells is known. The contrast between the blood estimation on the 22nd September and the 12th March is striking:—

| | | |
|---|---|---|
| Red blood corpuscles (per c.mm.) - | 3,070,000 | 4,160,000 |
| White blood corpuscles - | 260,800 | 8,000 |
| Ratio of white to red blood cells - | 1 : 11.7 | 1 : 520 |
| Myelocytes (N) - - | 159,088 | 560 |
| „ (E) - - | 10,432 | — |
| Polynuclears - - | 52,160 | 5,680 |
| Eosinophiles - - | — | 80 |
| Large hyaline - - | 26,080 | 880 |
| Lymphocytes - - | 13,040 | 800 |

Another feature of interest in connection with the blood was the absence of hæmorrhages in the skin, fundus, or mucous membranes, except on one occasion from his nose, which was mechanical in origin, and occasional slight streaking of the expectoration due to coughing.

*Coagulability.*—It was formerly considered that leukæmic

blood coagulated less readily than normal. In this case there was no evidence in support of such a view; in fact in the earlier part of his illness, as in a case recorded by Lazarus, it was on one or two occasions impossible to make a blood count owing to coagulation occurring in the tube of a Thoma-Zeiss apparatus.

*The Spleen.*—On admission the spleen occupied a large part of the abdominal cavity. It extended in a vertical direction from the sixth rib to the left anterior superior iliac spine. Horizontally the edge of the spleen was palpable three inches to the right of the umbilicus. One month later (21st October) the edge of the spleen was only one and a half inches outside the umbilicus. On 18th November the edge was only half an inch to the right of the umbilicus, and on the 27th November the edge passed through the right margin of the umbilicus. By the 12th December the edge of the spleen was half an inch inside the umbilicus. One month later (16th January, 1906) the spleen was three quarters of an inch to the left of the umbilicus, and its lower margin was now only two and a half inches below the umbilicus instead of extending below the line joining the anterior superior iliac spines. On the 27th January a further diminution in its lower margin was noted. By the 26th February the right margin was two and a half inches to the left of the umbilicus, and the lower margin was on a level with the umbilicus. On the 13th March there was observed a still further shrinkage of about one inch in the horizontal and vertical diameters. A reference to Illustration No. 2 shows a striking contrast between the size of the spleen on the patient's admission and on his discharge. The spleen was hard, and its edge was easily felt through the abdominal wall. At times marked friction was palpable and audible over its surface.

*The Lymphatic Glands.*—The axillary and the inguinal glands were very slightly enlarged, and were barely palpable. They showed no appreciable change during the six months the patient was under observation.

*The Liver.*—The edge of the liver was easily felt, extending from one and a half to two inches below the costal margin on the nipple line. No diminution in its size took place. The surface of the organ was smooth, and its consistence firm.

*The Long Bones.*—Notwithstanding the undoubted involve-

ment of the marrow, there was no tenderness on percussion over the sternum or femur.

*Gastro-Intestinal Symptoms.*—There were few symptoms or signs calling for any special observation. About the middle of December patient complained of severe pain in the abdomen, occurring in spasms, and on examination it was found that a localised swelling, produced by a portion of bowel, was visible. It was situated to the right of the middle line, and on palpation and pressure it diminished. It was probably caused by some slight obstruction due to perisplenitis, and subsided in the course of four or five days.

*Circumference of Abdomen.*—On admission he measured thirty-seven inches at the costal margin, and thirty-four at the umbilicus. By the 6th October the former measurement had increased by three-quarters of an inch, and the latter had risen to thirty-six inches. Two weeks later a slight diminution in both measurements was observed. This was followed by a definite increase, the circumference at the costal margin being thirty-nine inches, and at the umbilicus thirty-seven and a half inches on the 12th December. The last note on the abdominal girth was made on 26th February, when it was found that the costal measurement had fallen to thirty-five and a half inches, and the umbilical to thirty-four inches.

*Œdema.*—The first trace of œdema was observed on 6th October. It was noticed in both lower extremities and in the lumbar region. On the 2nd December the œdema had increased in the lower extremities, and on 8th December the abdominal wall had become swollen. By the 5th January the œdema had almost subsided, the only evidence of its presence being some pitting on pressure behind the malleoli. For some time previous to patient's discharge there was no œdema.

*Fundus Oculi.*—The eyes were kindly examined by Mr. Arthur Benson on two occasions. On 15th December he reported that there was no hæmorrhage, that there was some optic neuritis, and that the discs were œdematous and pale. On the 12th March he reported, "Optic neuritis definite in right eye, slight in left eye; no hæmorrhages; veins large."

*Temperature.*—Observations were made every four hours during the six months he was under observation. The maximum

temperature recorded was 100.4° F., and that was only on two occasions, both on the same day. Practically, his temperature was within normal limits, varying from 97.4° to 99°. It was generally 98°.

*Weight.*—On admission he weighed 11 stone 4 pounds. On 17th January he was at his lowest weight—viz., 10 stone 10 pounds. At his discharge he scaled 11 stone 7 pounds and 8 ounces.

*Urine.*—On admission, sp. gr. 1025; reaction, acid; albumen present, .6 per cent. (Esbach); sugar absent; chlorides present; indican present. A microscopical examination on 6th October disclosed some red and white blood cells, granular and hyaline casts. On the 14th December crystals of uric acid, granular and leucocytic casts, and red and white blood cells were observed in the sediment. The percentage of albumen diminished, and the amount of urine increased from sixty to eighty ounces. During the months of January and February a still further reduction in the percentage of albumen occurred, so that towards the close of his stay in hospital the percentage passed was only .06 to .08—*i.e.*, one-tenth of the percentage on admission.

*Metabolism.*—In the earlier part of the illness no complete analysis of the urine was made. Some preliminary observations were made in December, and from then it was found that the total nitrogen averaged about 13 grams per diem, the urea varied from 20 to 23 grams, the uric acid from .8 to 1 gram per diem, and $\Delta = -.80$.

A more detailed analysis was undertaken by my friend and pupil, Mr. Peyton, and we are both much indebted to Professor Thompson, who kindly placed the resources of the Physiological Laboratory at our disposal, and supervised the conduct of the analysis.

The object of the investigation was twofold—(1) With reference to the amount of uric acid which the patient eliminated, and (2) to determine if the application of the X-rays produced any marked metabolic changes.

The annexed table, showing determinations extending over a month, does not disclose any marked alteration in

metabolism. The average daily diet during this period was:—Milk, 1 pint; tea, 2 pints; meat (cooked), 6 ounces; gravy, half an ounce; potatoes (cooked), 6 ounces; rice pudding, 4 ounces; bread, 12 ounces; butter, 1 ounce; eggs, 2.

He had during the same period at least eight exposures to the X-rays, each of fifteen minutes' duration. So far as this case is concerned, the X-rays do not seem to have produced any profound alteration in metabolism.

*Treatment.—Diet*—The only extras in the patient's diet were eggs and raw beef juice. The latter was given at first in quantities of 2 ounces per diem, increased on 2nd October to 4 ounces daily. This he took regularly till December, when he got tired of it.

*Rest.*—The patient was kept in bed for the greater part of his illness.

*Drugs.*—Citrate of iron and ammonia, in doses beginning with 5 grains and subsequently increased to 10 grains, three times a day. Liquor arsenicalis in 2 minim doses, subsequently increased to 3 minims, three times a day. On 9th October he was ordered the pil. phosphori gr. i. In addition to the above he was given from 2nd December two of the pil. ferri three times a day. On 27th January all medicines were stopped.

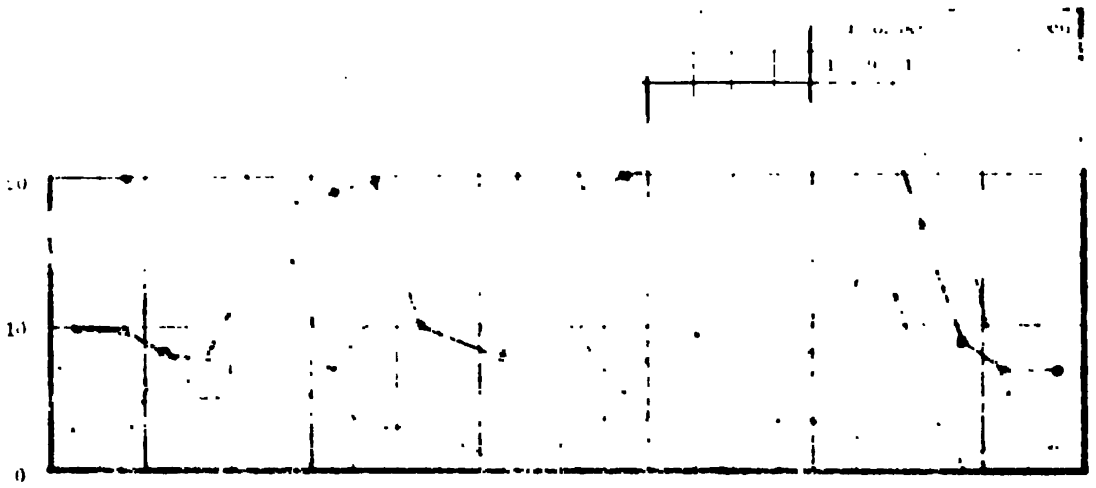
*X-Rays.*—This treatment was commenced by Mr. Charles Benson, F.R.C.S.I., X-rayist to the hospital, on 11th December. The patient had a sitting every two or three days of fifteen minutes' duration. The distance of the globe was six inches, and the splenic area was exposed. After fifteen sittings it was noticed, on 23rd January, that a slight degree of dermatitis had been produced. This was so marked after the sitting of the 25th January that the X-rays were not again applied till the 30th January. On 1st February the knees were exposed, but on 3rd February the rays were again applied to the spleen and continued till 12th March. Total number of sittings, thirty-five.

In considering how far the improvement in this case should be assigned to the X-rays, assistance will be

QUANTITATIVE ANALYSIS OF URINE FROM A CASE OF MYELÆMIA.

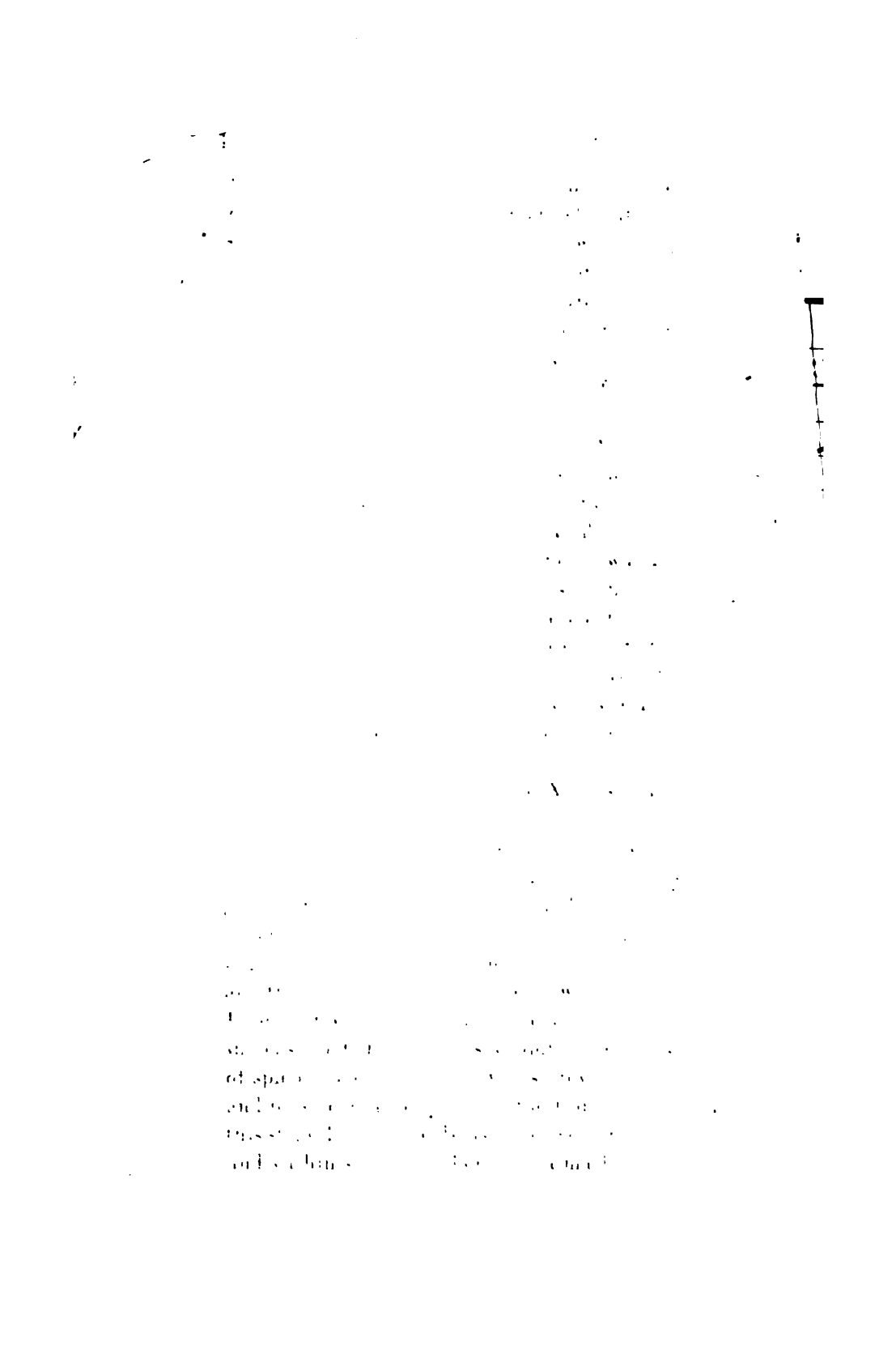
| Date | Total Urine | Sp. Gr. | Reaction | Total Nitrogen | Urea | Uric Acid | Chlorides | Phosphates | Albumen per cent. (Esbach) | Total Albumen |
|---|---|---|---|---|---|---|---|---|---|---|
| 1906 | | | | | | | | | | |
| Feb. 9 | 2,000 ccs. | 1013 | Acid | 12.6 grms. | 26.8 grms. | | | | .15 | 3.42 grms. |
| " 10 | 2,280 " | 1011 | " | | 28.7 " | | | | .075 | 1.56 " |
| " 12 | 2,080 " | 1008 | " | 13.68 " | 27.3 " | | 14.56 grms. | 2.8 grms | .1 | 2 " |
| " 13 | 2,000 " | 1012 | " | 15.12 " | | | | | .1 | 2.16 " |
| " 14 | 2,160 " | 1009 | " | 15.97 " | 29. " | | 12.52 " | 2.16 " | .09 | 1.96 " |
| " 15 | 2,180 " | 1010 | " | 14.34 " | 23.1 " | .56 grms. | 13.08 " | 2.18 " | .07 | 1.55 " |
| " 16 | 2,220 " | 1008 | " | 13.98 " | | | 15.54 " | 2.03 " | .09 | 2.14 " |
| " 17 | 2,380 " | 1007 | " | 14.94 " | 26.6 " | .65 " | 14.75 " | 2.18 " | .1 | 2.28 " |
| " 18 | 2,280 | | | | | | | | .07 | 1.45 " |
| " 19 | 2,080 " | 1008 | " | | 26.9 " | .54 " | 11.02 " | 2.64 " | .08 | 1.64 " |
| " 20 | 2,060 " | 1010 | " | 13.38 " | 28.4 " | .73 " | 11.94 " | 2.47 " | .06 | 1.38 " |
| " 21 | 2,300 " | 1009 | " | 15.97 " | 33.7 " | .78 " | 12.65 " | 2.57 " | .07 | 1.48 " |
| " 22 | 2,120 " | 1010 | " | 12.38 " | 26.3 " | .49 " | 11.87 " | 1.9 " | .08 | 1.55 " |
| " 23 | 1,940 " | 1008 | " | 11.85 " | 22.3 " | .53 " | 12.02 " | 1.74 " | .07 | 1.63 " |
| " 24 | 2,340 " | | | | | | | | .08 | 1.76 " |
| " 25 | 2,200 " | | | | | | | | .08 | 1.69 " |
| " 26 | 2,120 " | 1008 | " | 13.05 " | 23.7 " | .54 " | 13.56 " | 1.9 " | .09 | 1.74 " |
| " 27 | 1,940 " | 1010 | " | 13.73 " | 27.4 " | .53 " | 12.42 " | 2.9 " | .06 | 1.52 " |
| " 28 | 2,540 " | 1007 | " | 12.56 " | 26.4 " | .47 " | 11.94 " | 1.7 " | .08 | 1.95 " |
| March 1 | 2,440 " | 1009 | " | 14.48 " | 28.2 " | .55 " | 14.88 " | 1.46 " | .07 | 1.54 " |
| " 2 | 2,440 " | 1007 | " | 12.81 " | 24.2 " | .53 " | 12.32 " | 2.06 " | .07 | 1.7 " |
| " 3 | 2,220 " | 1009 | " | 15.40 " | 33.9 " | .78 " | 14.64 " | 2.32 " | .06 | 1.44 " |
| " 4 | 1,800 " | | | | | | | | | |
| " 5 | 2,420 " | 1009 | " | | 35. " | | 14.48 " | 2.27 " | | |
| " 6 | 2 200 " | 1007 | " | | 23.8 " | | 13.42 " | 1.93 " | | |
| " 7 | 2,420 " | 1009 | " | 12.99 " | 26.4 " | | 16.45 " | 2.3 " | | |
| " 8 | 2,400 " | 1010 | " | | 32.4 " | | 15.36 " | 2.52 " | | |

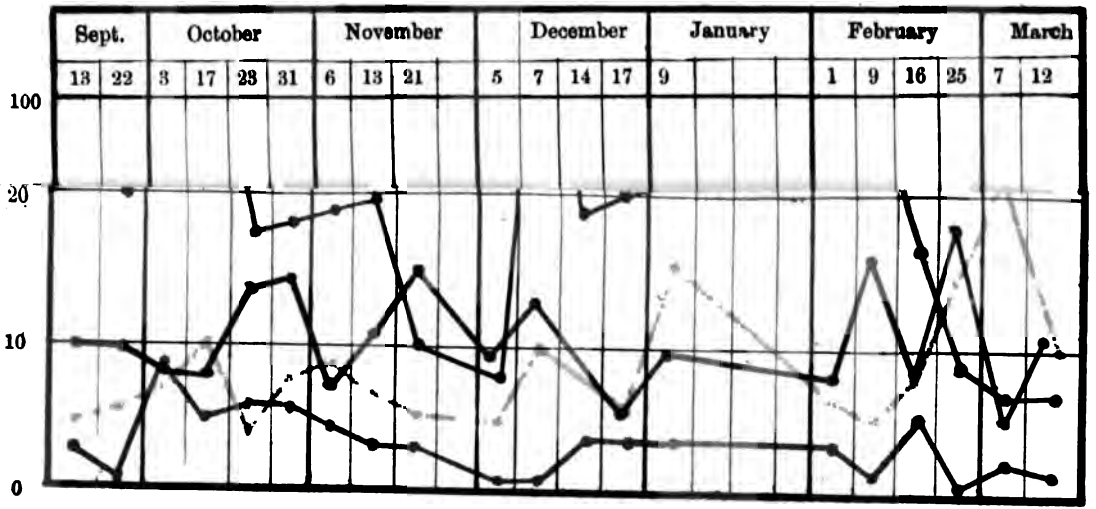
obtained from a reference to the table of blood counts and the diagrams. It will be observed that a very marked diminution in the number of the white blood cells had occurred before the application of the X-rays. The number of white cells had fallen from 260,000 to 67,000 per c.mm. Immediately after the commencement of the application of the X-rays there was a slight rebound to 105,000, followed during the period of application of the rays by a diminution to the normal. There is, therefore, in this case no conclusive proof that the X-rays exercised any beneficial action in diminishing the number of white blood cells. An examination of the alterations in the hæmoglobin and erythrocytes leads to a like conclusion. If we inquire how far the light treatment was responsible for the diminution in the size of the spleen it will be remembered that on admission the spleen extended three inches to the right of the middle line, and that it had shrunken to half an inch inside the umbilicus by the 12th December. During the following thirteen weeks a further remarkable diminution in the size of the spleen took place, but it cannot be asserted that this subsidence would not have occurred in the absence of the X-rays. In spite of the diminution in the size of the spleen and in the number of the leucocytes, the patient's condition was most critical in the first and second weeks of December. He was most pallid, the hæmoglobin and the red blood corpuscles were lower than on admission, dropsy had been steadily extending upwards and was well marked on the abdominal wall, and the abdominal measurements were at their maximum. It seemed at this stage as if the œdema would continue to increase and the patient succumb (as I had seen in a case of splenic leukæmia some years previously) with anasarca and passive effusions into all the body cavities. It was at this stage I asked Mr. Benson to begin the X-ray treatment, and within six weeks there was a marked improvement in




Differential Count of Leucocytes in Percentages.

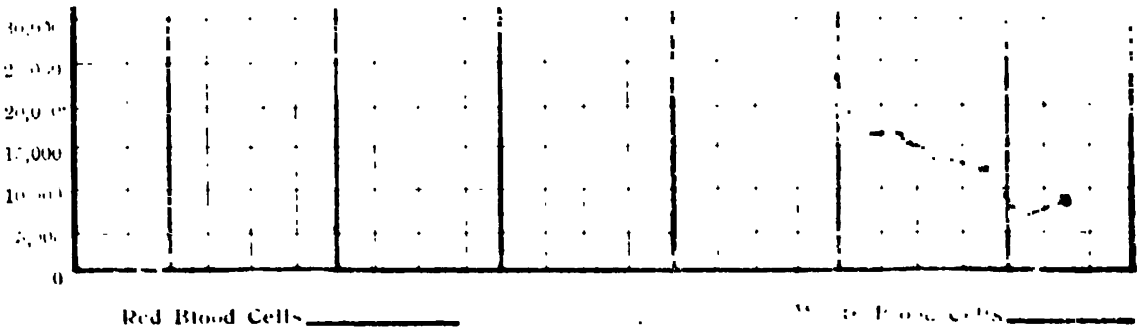
Myelocytes ——— Polymorphs - - - - Large Hyaline — Lymphocytes Eosinophiles . .



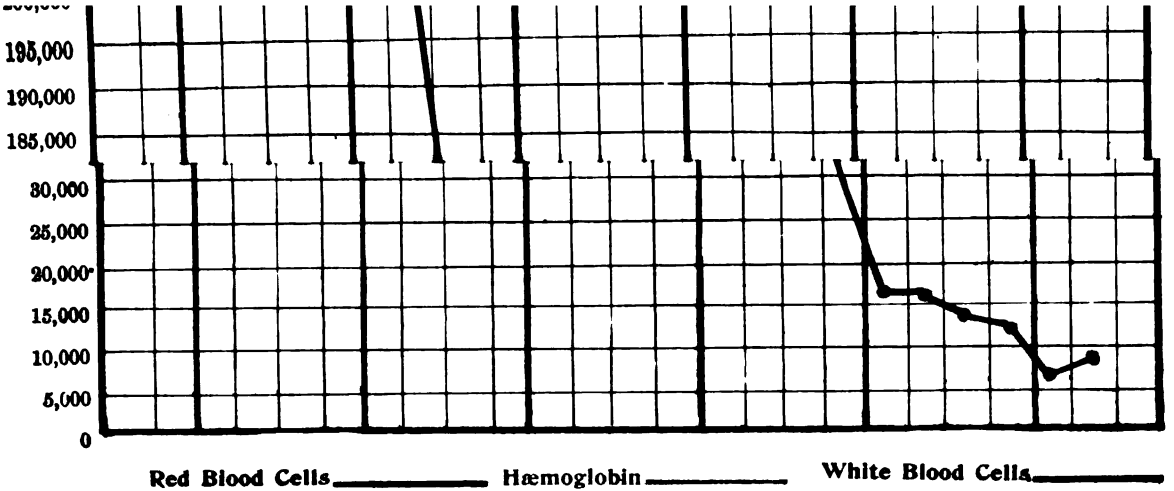



**Differential Count of Leucocytes in Percentages.**

**Myelocytes_____ Polynuclears - - - - Large Hyaline_____ Lymphocytes -.-.- Eosinophiles _____**


0
Red Blood Cells

190,000
185,000


195,000
190,000
185,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Red Blood Cells
Hæmoglobin
White Blood Cells

# BRIEF NOTE ON A CASE OF TUBERCULAR CEREBRAL TUMOUR (PRODUCING SUDDEN HEMIPLEGIA) IN A CHILD.

By R. TRAVERS SMITH, M.D., F.R.C.P.I.;
**Physician, Richmond, Whitworth and Hardwicke Hospitals.**

**[Read in the Section of Medicine, May 18, 1906.]**

Thomas K., aged two and a half years, was admitted to the Whitworth Hospital on February 2, 1906. The child's mother gave the following history of his illness:—He had been a perfectly healthy child till January 1, 1906, when his mother noticed that he had suddenly lost the use of his right arm completely, and that he walked lamely on the right leg. In the course of two days the right leg had lost all power. During this time the child was peevish and cross, and wagged his head from side to side. A fortnight later the paralysed leg and arm began to get drawn up and stiff. The mother noticed no signs other than these. She further stated that she had six healthy children living, three had died—one of meningitis, another suddenly (cause unknown), the third was stillborn.

On admission, four weeks after the onset of the paralysis, the following points were noted:—The child was plump, and looked well nourished. The anterior fontanelle was not closed, but did not bulge. Intellect was not impaired. Apparently the right leg and arm were devoid of any power of voluntary movement, and were astonishingly rigid owing to tonic muscular spasm. The arm was adducted to the chest; elbow, carpus, and fingers strongly flexed; thumb flexed into palm. The right leg was flexed strongly at hip, knee and ankle. By applying steady force the rigidity could be overcome, this causing pain in the leg, but it returned at once when the force was removed. The paralysed arm and leg showed no reflex movement owing to the great spasm already existing. Babinski's sign was not present. Painful sensation was present in the affected limbs; it was futile to test tactile sensibility in so young a child. The left leg was

constantly kept in the same position as the right one, and, though somewhat rigid, retained voluntary movements. The face, tongue and eyes were free from paralysis. All the internal organs appeared normal on examination.

Massage was ordered for the rigid limbs, with slight improvement as a result, otherwise the child's condition remained as on admission for three weeks. On February 21, the child's temperature rose to 101.4° F; he became cross, restless, and developed a cough. A few days later he was noticed to be stuporous and to vomit. By March 3 general meningitis was diagnosed by coma, by other signs of cerebral compression, and strabismus. Finally general convulsions set in, and the child died on March 6.

*Post-mortem.*—General miliary tuberculosis of the cerebral pia-arachnoid was found. The cerebral ventricles were moderately distended with clear fluid. A large, sharply circumscribed tubercular tumour, the size of a hen's egg, was found in the region of the corpus striatum of the left side. It was caseous throughout, but not very soft. There was no appearance of hæmorrhage, either recent or old, in or around the tumour.

Interesting points in the case were (*a*) the unusually large size of the tumour; (*b*) its position above the tentorium cerebelli; (*c*) its existence in an apparently perfectly healthy child, but remaining latent till hemiplegia suddenly resulted.

# ON ARTIFICIAL RESPIRATION.

By ROBERT H. WOODS, M.B., F.R.C.S.;
Throat Surgeon to the Richmond Hospital, Dublin;
President of the British Laryngological, Rhinological, and Otological Association.

[Read in the Section of Medicine, May 18, 1906.]

It has frequently occurred to me to wonder why, in performing artificial respiration for the resuscitation of patients showing signs of syncope under anæsthesia, the Sylvester method of inflating the chest by movements of the arms is so generally adopted.

On looking into the history of the method[a] I find that before the year 1756 the "immediate insufflation," or mouth-to-mouth method, was employed exclusively. Of course, the cases which came under treatment at this period were almost invariably those of drowning. This method, as advocated by Dr. Fothergill early in the eighteenth century, is thus described:—

"He placed his mouth to the mouth or nostril of the patient, or, as was the more common, as well as the more desirable, practice, he made a funnel of his right hand, placed that by the outer (ulnar) part over the nostrils, and closing the mouth of the patient and putting his own mouth to the opening of the funnel formed by the thumb and forefinger, he breathed through the funnel backwards and forwards, so as to empty and fill the lungs of the patient."

In the year 1756 Joseph Black, M.D., the celebrated chemist, demonstrated the toxic action of carbonic acid

[a] Asclepiad, 1890. P. 277.

gas—then called "fixed air"—and proved its presence in expired air.

The deductive reasoners of that day, startled by the discovery that a poisonous gas was exhaled by the lungs, determined that immediate insufflation was dangerous. The result was that the method, previously considered effective, fell into complete disuse—for it was argued that to pour the exhaled breath of one human being into another human being was to commit a grave physiological error, and to intensify the bad condition which was already present.

Manipulative methods of various kinds were accordingly substituted. All these seem to have had for their principle expulsion of some of the residual air by compression of the chest, a like quantity returning to the chest when the pressure was removed. This compression was either effected by direct pressure on the chest and abdomen, or indirectly by Hall's method, where the patient was rolled gently from the side to the front part of the chest and back again about fifteen times a minute.

These methods were defective enough, and when in 1857 Sylvester introduced his plan it was justly regarded as an enormous improvement on the almost futile practices then in vogue. Its underlying principle was to increase the chest capacity by raising the arms over the head so as to put the extraordinary muscles of respiration on the stretch, and then by bringing the arms down again and compressing the chest to expel not only the air which entered during the first movement, but also some of the residual air. By repetition of this process a fair amount of tidal air was made to flow and ebb, certainly much more than was possible by any of the previous manipulations.

Some idea of the unreasoning way in which artificial respiration was sometimes practised before Sylvester's

time may be obtained from one of his original letters, in which he drew attention to the futility of applying compression to the chest wall of the newly born baby, showing that since there was as yet no air in the chest to expel, compression could not alter its amount. Contemporary ideas on the mechanism of respiration must have been somewhat nebulous, when the necessity of alluding to so obvious a point existed.

Since the method of immediate insufflation was discarded a century and a half ago, no one, so far as I can find, has seriously questioned the validity of the grounds on which this important step was taken. Benjamin Ward Richardson, it is true, in order to overcome the objection to the mouth-to-mouth method, devised a special bellows for insufflation, but the suggestion is a counsel of perfection, for the apparatus is never at hand when needed.

If the above description is correct where it says the operator "breathed through the funnel backwards and forwards so as to empty and fill the lungs of the patient," it certainly was not ideal, either for the operator or the patient, and should have been modified as follows:—The operator first takes a deep breath or two, so as to purify his own lungs, and by a single puff fully inflates the patient. During this act sufficient pressure is applied to the cricoid cartilage to keep the gullet closed, and thus prevent the air from entering the stomach. Then removing his mouth from the patient's mouth or nose, the inflated air is allowed to escape, the last portion of it being expressed by moderate pressure on the chest and abdomen, the process being repeated about every five seconds. Assuming that this practice is followed, I shall endeavour to show that the method is superior to any other.

In the first place, the quantity of air introduced into the chest by blowing is very much greater than by Sylvester's

method, for, even supposing the amplitude of the chest wall movement to be no greater, the positive pressure in the thorax will cause the descent of the diaphragm, and so greatly increase the volume of air admitted.

In the resuscitation of the apparently drowned, two effects are sought—first, the starting of the heart mechanism, and, secondly, the oxygenation of the blood. In cases of poisoning by volatile drugs, such as chloroform, there is a third effect desired—viz., the elimination of the poison. As far as starting the heart mechanism is concerned anyone can prove on himself that increasing the depth of the respiration increases the force and frequency of the heart beat. It is fair, therefore, to assume that the better the chest is filled the greater will be the stimulus to the heart's action. The method, therefore, by which the largest volume of air is made to ebb and flow will, both from this point of view and that of an elimination of a volatile drug, be the best.

Now, as regards æration of the blood, this is the point on which it seems to me the theorists of the eighteenth century went entirely wrong. They allowed themselves to be frightened from a most excellent practice by the inference drawn from the fact that exhaled air makes lime water turbid. No one doubts that carbonic acid gas is poisonous, but to say that it is present in poisonous quantity in expired air is absurd. Patients breathe and rebreathe the air from the bag of an ether inhaler for a very considerable fraction of an hour at a time, with no bad effects, though the quantity of carbonic acid gas present must necessarily be very high, and the oxygen minimal.

Again, even admitting the theoretical impurity of expired air, it is safe to say that any defect in its quality is more than compensated for by the extra quantity introduced by the mouth-to-mouth method, while in addition

we must remember that by comparison with that in the lungs of a poisoned or asphyxiated patient it is purity itself.

But then there is yet another point for consideration. At the end of the operator's inspiration the column of air from the bifurcation of the trachea upwards may be regarded as entirely pure. Now this is the portion which first reaches the patient's lungs. If before inflating the patient he rapidly takes two or three deep inspirations, so as to include both supplemental and complemental air, as divers do before going under, even the theoretical objection to expired air is got rid of, for its purity is as great as if it came from a bellows.

It has fallen to my lot to have seen several cases of syncope under chloroform. I may mention four of the worst. Two did not recover, though Sylvester's method was practised. In a third, a case of sarcoma of the throat in a powerful man, aged about thirty, I had done a preliminary tracheotomy. Chloroform was given through the tracheal tube. Bleeding was at first free; later I found he was not bleeding at all. The anæsthetist simultaneously raised an alarm. The patient had ceased to breathe, the skin was pallid, the pupils dilated, the cornea anæsthetic, and the pulse absent, or at least impalpable at the wrist. I insufflated the patient through the tracheal tube. In a minute or two his colour returned, and he began again to breathe and bleed.

In another case, that of a girl aged fourteen, on whom I operated some years ago, being assisted by an anæsthetist of great experience, a similar condition of profound collapse occurred. The patient was restored after a moment or two of direct insufflation.

Of course, in any given case it is impossible to say that the patient would or would not have recovered by another

method, but it seems to me to be clear from every consideration that the mouth-to-mouth or nose method gives the patient the best chance, for, to recapitulate:—

(1) The quantity of tidal air is greater than by any indirect method, and, therefore, the stimulation of the mechanisms of circulation and respiration, the elimination of the poison, and the oxygenation of the blood are all as great as possible.

(2) The impurities, if present at all, are negligible.

(3) The method can be applied without a moment's loss of time.

# THE NAUHEIM TREATMENT.

By A. AINSLIE HUDSON, M.D., F.R.C.S. Ed.;
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[Read in the Section of Medicine, May 18, 1906.]

1. *The Nauheim Treatment*, or, as it is sometimes called, the Schott-Nauheim treatment, was, as its name implies, first practised at Nauheim, in Germany, by the brothers Theodor and August Schott, to whose researches we owe most of our present knowledge of this valuable method. The treatment, as practised at Nauheim, consists in the immersion of the patient in effervescing saline baths, with the addition of certain exercises which may be merely passive, or those known as resistive exercises—the two, baths and exercises, being employed conjointly or separately; and this treatment may or may not be combined with massage, as the case may demand.

Briefly, the composition of these baths is as follows:—They are derived from certain springs at Nauheim, at temperatures varying from about 60° F. to 90° or 95° F. They are rich in salines, of which the most abundant are sodium chloride (1 to 3 per cent.) and calcium chloride (.2 to .5 per cent.) and bicarbonates. They contain, moreover, free carbon dioxide, which is deposited on the surface of the patient's skin in the form of minute bubbles. The irritation produced by the bursting of these bubbles, which imparts a peculiar, prickly sensation to the skin, and the stimulating action of the saline ingredients contained in the water, are the essential factors in the production of the beneficial results of this treatment. Certain modifications of these baths are to be found at different places

on the Continent, but their effect is in the main the same, and their variety depends upon the varying quantity of the saline materials to be found in them, and also in the presence, in addition, of certain other mineral ingredients, such as iron, sulphur, &c., the latter being an important ingredient in the Aix la Chapelle bath.

*The Physiological Explanation of the Phenomena.*—These, as I have pointed out, are due to the combined effects of the salines in the water and to the minute bubbles of $CO_2$ gas, which, settling on the surface of the body, and there bursting, set up an irritation which, acting on the skin, produces a general effect through the entire nervous system, thus constituting a purely nervous phenomenon.

Another theory, and one which seems to be more satisfactory, is that of Baruch, Professor of Hydro-therapeutics in the New York Post-Graduate School. His view is supported by Woods-Hutchinson, Professor of Comparative Physiology in the University of Buffalo.

They hold that it would be impossible for the heart to propel the blood through the peripheral vessels unless these vessels were endowed with a propulsive power, capable of furthering the onward flow of the blood contained in them, and this theory has been suggested entirely by their clinical observations.

Woods-Hutchinson has adopted an ingenious term to express this power on the part of the cutaneous vessels, when he speaks of the "skin heart" as an important factor in the human circulation.

It is granted by all physiologists that the propulsion of the blood is largely due to the elasticity of the vessels whose calibre is changed by the contractions and relaxations of the powerful muscular coat; but Woods-Hutchinson goes one better. He suggests that in all probability

these muscle cells are possessed of far wider powers than that of merely being capable of such mechanical changes as regulating the calibre of the vessels they surround. Amongst the higher invertebrates and some of the lower vertebrates this same muscular wall, throughout the entire circulatory system, plays an extraordinary active part in regulating the circulation, there being localised aggregations of the same muscular fibres in two or three more places in the body. Even in some of the higher mammals, such as the larger hoofed animals, are to be found pulsating networks of arteries, which may be regarded as accessories to the heart. The further we go down the scale the more frequently is this found to be the case. In the wing of the bat, the fins of fishes, the web and mesentery of the frog, the rabbit's ear, and elsewhere, the vessels are known to possess the power of rhythmical contraction. The heart's action is intrinsic, and when we recall the fact that the great mesh of cutaneous vessels is capable of containing over 30 per cent. of the blood in the entire body, and that the whole of this surface is affected by the bath, it would seem that it is the stimulation of this "skin heart" that is the factor in improving the circulation. Unstriped muscle cells elsewhere in the body are possessed of the power of rythmical contraction, so why not in the walls of the blood vessels? Assuming, then, that the cutaneous vessels have the power of inherent rhythmical contraction, let us see how they might be expected to behave under certain special conditions, as during the process of a Nauheim bath. The immediate effect of the application of the water, rich in saline material, is to produce a powerful stimulation of the muscular coats of the superficial blood vessels, and this is greatly enhanced by the presence of the $CO_2$, that unrivalled stimulant of unstriped muscle fibres, thereby improving

the tone of the vessels; but we must, if we adhere to our premise, regard this as an active rather than a reflex condition. As to the effect on the heart of this process there is some diversity of opinion. Immediately following on the local stimulation comes a rapid reactionary dilatation, which dilatation has been usually credited with the relief of the heart by diminishing the peripheral resistance. But Winternitz, on the other hand, points out that, as in the case of the fever patient, whose flushed face denotes an already distended condition of the peripheral vessels, the general improvement caused by cold sponging is rather due to an increased *resistance* in the peripheral circulation, and that in the same way the frictional irritation produced by the bubbles of $CO_2$ is responsible for the improved tone of the heart by increasing their resistance. The lymphatic and venous systems are undoubtedly stimulated likewise, with the result that stagnation is removed and an abundance of blood is supplied to the right side of the heart, in itself a stimulus for systolic contraction. The kidneys, in their turn, are flushed with an abundance of blood, as evidenced by the increased urinary secretion after the treatment, so that whatever be the precise physiological phenomena, the practical effect is unmistakable. The pulsations of the heart are greatly reduced in frequency, become more regular, and are increased in force, so that the work, that was previously almost too much for it, is performed with comparative ease and comfort, and so great is the effect of the bath that in some severe cases of dilatation the apex has been known to retract three-quarters of an inch towards its normal position in a single treatment. The blood pressure is raised, the breathing becomes regular and quiet, the functional activity of the skin and kidneys is increased, and the general comfort of the individual is improved.

*Technique of the Process.*—As to the length of course required, eighteen to twenty baths, and never more than thirty, are taken in sets of three, with a day's rest between each set. However, sometimes two only are taken in succession, and sometimes four. The temperature, as a rule, should be 95° to 98° F., according to the time of year. At the commencement of the course it is advisable to limit the bath to five minutes, but the time may be lengthened daily by a few minutes, until a maximum of fifteen or twenty minutes has been reached. Two hours must have elapsed since the last meal before a bath is taken, and it should not be given if the patient is tired. After the bath the patient is wrapped in a warm sheet and dried, while seated, by the nurse. This is followed by an hour's rest in the recumbent position. The pulse is taken before and after the bath, and a trained attendant must be in charge of every case, who is capable of observing any slight change in the appearance and breathing of the patient which would call for the stopping of the bath.

*The Nauheim Exercises* are employed as an accessory to the bath, and, as I pointed out, these exercises may be passive or resistive. Passive movements relieve the heart; resistive movements—which can be graduated from the mere weight of the operator's hand to a much more powerful resistance—quicken the circulation in the muscles brought into action, and produce a reflex condition of the cardiac muscle. The resistance must be either manual or mechanical—that is to say, by means of certain mechanical devices which take the place of the attendant's manipulations in resisting the patient's movements. At the beginning movements of the upper extremities only are employed, afterwards those of the lower extremities and trunk. A pause of half to one minute occurs between each movement, and the exercises are not given within one and

a half hours after a full meal. The dress is loose, so as not to constrict any part of the body, and no movements are repeated on the same limb at the one sitting. The movements are performed slowly, and at a regular rate. They may be given in a reclining position, sitting, or standing, according to the requirements of the case and the condition of the patient. Should signs of exhaustion appear, such as palpitation, dyspnœa, pallor, or any other signs of distress, they must be discontinued. Speaking generally, the resistive exercises consist in the patient performing the movements of flexion, extension, adduction, abduction,and circumduction, &c., of the limbs, and certain movements of the trunk, these movements being opposed by the attendant throughout the process. These exercises may be practised at a convenient interval after the bath each day, or at a different time of the day, and may be made to alternate with the bath, according to the individual requirements and exigencies of the case, and they should be continued throughout the course of baths. It will be seen, therefore, that a full course, as given at Nauheim, entails from a month to six weeks' treatment, and as the process has undoubtedly a tendency to general relaxation of the system, patients are advised when the course is over to go for a few weeks into the mountains to be braced up.

*The Indications for Nauheim Treatment.*—Speaking generally, the indications for this treatment are chronic affections of the heart, especially the passively dilated heart associated with fatty infiltration as a part of general obesity or senile changes, the weakened heart left by influenza or other acute affections, the flabby, lifeless organ associated with anæmia and neurasthenia, the heart impaired by excessive strain from running or other athletic exercises, and the heart of the patient with arterio-

sclerosis, chronic gout, or rheumatism. In a much more restricted degree is it to be employed in valvular diseases. Now, as it is beyond the possibility of every sufferer from one of the above conditions to go to Nauheim, let us see what can be done by artificial means to procure a substitute for the natural mineral springs which shall be within the reach of everyone. The essential elements in the preparation of such a bath are a proper amount of salinity and some means of setting free in the water a certain volume of carbonic acid gas. There have been several methods of doing this suggested, but for the purposes of this description it will only be necessary to mention two. For a bath of between 40 to 50 gallons add 10 lbs. of sodium chloride, 10 ounces of calcium chloride, and, after these are thoroughly dissolved, add 1½ lbs. of bicarbonate of soda. The acid is now required to complete the process of effervescence. This may be obtained by adding to the bath, just before the patient enters it, 2½ lbs of hydrochloric acid, which should be thoroughly mixed with the alkaline solution, when the effervescence immediately begins. This method has its disadvantages; the effervescence is too rapid, and, consequently, does not last long enough, and unless the acid is intimately mixed with the solution the effervescence is not uniformly distributed over the whole bath, and, moreover, there is some danger from undue irritation of the skin by the incompletely diluted acid, to say nothing of the risk to the attendant of handling the strong acid. To obviate this I have adopted a method employed at Harrogate in the administration of these baths. In a glass vessel provided with a stop-cock and placed on a bracket at a convenient height above the bath is poured the hydrochloric acid diluted to the extent of 1 in 6. From the stop-cock is dependent a tube of fine calibre, the lower end of which is inserted into another

tube that encircles the bath at a distance of about six inches from the bottom, in which are arranged minute perforations at intervals, pointing inwards—that is, towards the bather. On turning the stop-cock the acid descends the vertical tube, and on entering the horizontal tube on the inside of the bath is distributed in minute jets throughout the whole bath. By this means the effervescence is rendered uniform, and the supply of acid is under control. A simpler method than the above, and one which fulfils every requirement, is that devised by Ernest Sandow, of Homburg, who supplies the necessary ingredients through his agents in London for any kind of carbonated bath (plain, brine, sulphur, or chalybeate). The quantity of carbonic acid gas liberated during the process is 3,000 to 4,000 cc.m. to every gallon of water used. Baths prepared in this way equal in their percentage of free carbonic acid the springs of Nauheim or Kissingen, Schwalbach, &c., and by the above means an intensified local action may be obtained to the back, abdomen, or even to vagina or uterus by means of a speculum. The ingredients used in this method are in a solid and compact form, easily portable and easy of application. It is only necessary to dissolve the required amount of the alkali in the bath before the patient enters it and then to place the acid tablets on the bottom of the bath, close to the patient's body, when the evolution of the carbonic acid gas will at once begin. Should an intensified action be desired on any given part of the body drop the contents of the alkali and acid parcels on the same spot after entering the bath, when a brisk evolution of carbonic acid will begin at once. Let me here emphasise the importance of having a skilled attendant to administer the bath, who is capable of appreciating the possible risks involved, and who can bring to

bear upon the treatment a reasonable intelligence and solicitude for the well-being of the patient.

Before leaving the subject I would like, in conclusion, to take the opportunity of saying how strongly I deprecate the prevailing idea generally inherent in the patients themselves, that any form of hydropathic treatment, undertaken, it is understood, as often as not as a last resource in the course of some intractable chronic ailment, is to act like a charm, and that they can expect to be cured in a couple of weeks—the average time they generally devote to a "cure"—of a disability that they have, perhaps, taken ten or even twenty years to acquire and thoroughly assimilate. It is just this class of case that brings disgrace on what, in many instances, if properly and systematically undertaken, with due regard to the length of course necessary, would prove of inestimable value to a large number of sufferers.

# ABSTRACTS.

## SECTION OF MEDICINE.

*Friday, November* 10, 1905.

DR. JAMES LITTLE in the Chair.

DR. WALTER SMITH made a communication on "Solubility as applied to Urine; The Theory of Gout—A Protest" (see page 1, *ante*).

DR. DAWSON read "Notes on a Year's Asylum Work" (see page 17, *ante*).

*Friday, December* 8, 1905.

DR. JAMES LITTLE in the Chair.

DR. MATSON made a communication upon a "Case of Acute Graves's Disease with Fatal Termination" (see page 30, *ante*).

DR. C. M. O'BRIEN read a paper on "Carcinoma Cutis," with notes of two cases—(*a*) Cancer *en cuirasse*, in a woman, aged thirty-nine. When first seen by him the growth had involved two square inches of right breast, including the nipple and areola. A month later the skin of the upper part of the left breast became involved; the growth spread so rapidly that the entire chest became encased within ten weeks of her admission to the Skin Hospital. She died within six months from onset, notwithstanding that 10 minutes exposures to X-rays were given daily for 13 weeks. (*b*) Paget's disease of nipple, in a man, aged fifty-three. The right nipple and areola were infiltrated, the former slightly retracted; the limitation of the patch, and its red, raw, granulating appearance, were very characteristic; for a period of nearly three years it had failed to yield to almost every well-known remedy for eczema.

DR. W. G. SMITH referred to the rarity of Paget's disease in a man. He discussed the diagnosis, laying stress on the extremely sharp limitation of the disease and the leathery induration of the skin.

Dr. Winter spoke of a case where a patient had improved on treatment with X-rays, but going away before a cure had been effected, returned, and was treated with radium; though again going away before completion of treatment the case had gone on improving, and no return had occurred since—an interval of twelve months.

Dr. Travers Smith recorded a case of "Hemiplegia in a Child" (see page 33, *ante*).

Dr. Parsons read a paper on "The Stokes-Adams Syndrome" (see page 38, *ante*).

Dr. Kennedy showed a case of tumour of the brain.

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*Friday, January* 19, 1906.

The President in the Chair.

Papers on "The Diagnosis, Treatment and Pathology of Empyema" were read by Dr. W. G. Smith, Sir Thornley Stoker, Dr. Earl, Sir John Moore, and Sir Arthur Chance (see page 46, *ante*).

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*Friday, March* 2, 1906.

Dr. Finny in the Chair.

Dr. Drury, with Dr. Taylor, brought forward a case of "Cirrhosis of the Liver treated by Operation" (see page 85, *ante*).

Dr. T. Gillman Moorhead read a paper on "Anæmia Splenica Infantum" (see page 90, *ante*).

Dr. J. B. Coleman, C.M.G., read the notes of a case of "Unresolved Pneumonia treated by Pneumococcus Vaccine" (see page 97, *ante*).

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*Friday, March* 30, 1906.

Dr. Peacocke, in the Chair.

*Keratosis.*

Dr. W. J. Thompson exhibited a case of the above which had been under his care. The patient's personal and family history

was good, and before Christmas he was quite well. Then the palms of his hands and soles of his feet became rough, thickened, and swollen. The inside of the mouth became very much swollen, and the gums covered the teeth. His eyes were bloodshot; the skin thickened in the axillæ and about the elbows and chest. All the openings of the body, ears, eyes, &c., were swollen; that of the nose sometimes became ulcerated and painful. His organs, nervous system, reflexes, and thyroid were normal.

Dr. Wallace Beatty considered it to be an example of acanthosis nigricans, and exhibited a plate illustrating the affection.

Dr. W. J. Thompson said the patient was under thyroid treatment for the past three weeks with considerable benefit. He added that the man's genital organs were completely atrophied.

Dr. Finny read the notes of a case of "Bradycardia, with Arrhythmia and Epileptiform Seizures" (see page 99, *ante*).

Dr. Parsons read notes on a case of "Myelogenous Leukæmia and its Treatment" (see page 121, *ante*).

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*Friday, May* 18, 1906.

Dr. James Craig in the Chair.

Dr. R. Travers Smith read brief notes on a case of "Tubercular Cerebral Tumour," and exhibited the specimen (see page 134, *ante*).

Mr. R. H. Woods read a paper on "Artificial Respiration" (see page 136, *ante*).

Dr. A. Ainslie Hudson read a paper on "The Nauheim Treatment" (see page 142, *ante*).

# SECTION OF SURGERY.

## THE SURGERY OF THE STOMACH.

By T. E. GORDON, M.B., F.R.C.S.I.;
Surgeon to the Adelaide Hospital, Dublin.

[Read in the Section of Surgery, November 3, 1905.]

In this survey of the surgery of the stomach I will confine my remarks to the treatment of non-malignant disease. I have, indeed, only once attempted resection of part of the stomach for cancer. In that case the patient lived almost three years after the operation.

In dealing with non-malignant disease, I can pass over much which, formerly matter for controversy, has now passed into written law.

*Perforated Ulcer.*—There has been some difference of opinion concerning technical details in operating for perforated ulcer, some favouring evisceration and douching, others relying on dry sponging. I have myself adopted the former method in four operations which I have performed during recent years; of these, all recovered except one, and in that case, since the operation was delayed until forty hours had elapsed from the time of perforation, the failure cannot be assigned to the method employed. Other surgeons have had equal success without eviscerating or douching. Thus the question does not appear to be one of vital importance. It has been objected that the copious washings are likely to induce subsequent adhesion. In one of my four cases I found it necessary a year later to re-open

the abdomen to perform a gastro-enterostomy, and I found it free from adhesion.

*Gastrectasis due to Simple Pyloric Stenosis.*—I may be equally brief in reference to gastro-enterostomy as a treatment for stomach dilatation due to simple pyloric stenosis. I have had, in common with most operators, a considerable experience of this class, and the general good results obtained have led physicians to regard these cases as purely surgical. There is, therefore, no necessity to recite particular instances in defence of the operation, and even respecting details of method there is a remarkable unanimity of opinion. No doubt, some of the best surgeons still employ buttons, but by the majority among us these have been discarded for simple suturing. Even with regard to the time factor, which is often important, there is little if any advantage gained by the use of these appliances. I have, where minutes had to be considered, completed the entire operation in twenty minutes, and that without dangerous haste.

*Gastric Hæmorrhage.*—In gastric hæmorrhage there is more room for debate concerning treatment, but I shall not say much about it because my experience has been very limited. I saw with Dr. Peacocke an extremely anæmic girl, who was brought to the hospital on account of repeated and severe attacks of hæmatemesis. She had for some years been under treatment for gastric ulcer, of which the symptoms had been recurring attacks of severe stomach pain and vomiting. When we saw her she was so extremely weakened by loss of blood that we decided to delay operation. I operated after about a fortnight, and on exploring the stomach I could feel a large ulcer on the posterior wall near the lesser curvature. Posterior adhesions made the gastro-enterostomy difficult, and not entirely satisfactory. However, she had materially im-

proved when she went to the country some six weeks later, and there was no further hæmorrhage. She is now in excellent health.

Two facts stand out clearly relative to these cases of recurring hæmorrhage. One is that such hæmorrhage is directly dangerous to life; the second that operation, generally gastro-enterostomy, has proved successful in a majority of the cases.

*The Treatment of Chronic Ulcer.*—The case I have just cited will serve to introduce a difficult problem—the surgery of chronic gastric ulcer itself—*i.e.*, apart from its complications. In discussing this problem I shall exclude reference to choice of operation. When I speak of surgical treatment I mean posterior gastro-enterostomy. The solution of the problem is to be arrived at by a consideration chiefly of three things—First, *surgical experience* as regards ultimate result; secondly, *medical experience*—the prospect of cure without resort to operation; thirdly, *relative risk*—the risks of perforation or fatal hæmorrhage in cases treated medically as compared with the risks of operation.

1. *Surgical Experience.*—Among my own cases I have given one in which the result has so far been satisfactory. Another, a young girl, was placed under my care by Dr. Little. She had suffered from stomach pain for twelve years, had vomited blood on several occasions, was much emaciated, and had been confined to bed for nine months before she came to hospital. As the results of operation, this girl is now able to get about, can take her food, and has put on weight, *but* she still suffers from pain. There are, however, some reasons for thinking that the pain in this case is due to adhesions.

My personal experience is not large, but general experi-

ence seems to clearly prove that a cure may be anticipated in a majority of cases operated upon for chronic ulcer.

2. *Medical Experience.*—Now, what is to be learnt from the experience of physicians? With the assistance of the then house-surgeon, Dr. Carter, I investigated the cases of gastric ulcer which had been treated in the Adelaide Hospital during the past five years. We wrote letters asking these people certain questions, with regard to pain, for instance, and in the majority the answers were decidedly unsatisfactory; very few appeared to have been cured of their symptoms. Moreover, all the cases which we have operated upon have been treated medically for years. I think it must be conceded that medical treatment is likely to fail, in a majority of hospital patients, at all events.

3. *Relative Risk.*—I shall now ask you to consider the question of relative risk. I am confident that fatal gastric hæmorrhage and perforation are more common, probably much more common, than was at one time thought. During the past three years I have known of at least three people who died as the result of recurring gastric hæmorrhage. I have referred to four cases of gastric perforation which came under my own care during the past few years, and I am sure others have met with many more than this. We may, then, fairly assume that these catastrophes are not uncommon; that the risks attending chronic ulcer of the stomach are very real. At the same time, I am convinced that relative to the vast number of cases of gastric ulcer which occur in these countries, the catastrophes are uncommon, and, despite the apparent teaching of large hospital statistics, I believe that the risks have been altogether over-estimated. This cannot be said concerning the risks of operation, and yet I know that these also are very real. I have only had one death as the result of

gastro-enterostomy for non-malignant disease; the cause of death was hæmorrhage. That is a very rare accident, but I am sure I am not alone in this misfortune.

In another case a different accident occurred which might have proved fatal, but, fortunately, the patient recovered. This case was one of well-marked gastroptosis and consequent gastrectasis. I performed a posterior gastro-enterostomy, and a few days later re-opened the abdomen on account of persisting regurgitant vomiting. I found that an internal hernia had taken place; a large amount of small intestine had passed beneath the anastomosis from right to left—not, please note, into the lesser sac, which is a less uncommon accident. The bowel at the anastomosis was reddened and distended, whilst that which had passed under the anastomosis was contracted. I reduced the hernia and the patient recovered, but I fear the hope of ultimate perfect recovery is small.

The narration of these two misfortunes is sufficient to enforce my point—that gastro-enterostomy is attended with risks to life. I may further observe that it has lesser risks which, though not affecting life, may materially modify the ultimate success of the operation. I have in mind the possible formation of adhesions due to some error, perhaps unavoidable, in aseptic technique. I once operated upon a lady, who had suffered from gastric pain and other symptoms for many years, and found an extraordinary degree of deformity of her stomach, the result of previous ulceration and associated with adhesions. The stomach was so bent upon itself that the pylorus was drawn close to the cardia, and the lesser curvature was practically non-existent. There was a broad area of fibrosis running across the anterior surface, a dilated pyloric antrum, and a narrowed pylorus. I made a gastro-enterostomy on the cardiac side of the fibrous area, although this side was not

dilated at the time. Good was done for a time, but within a year the patient's sufferings were much as before the operation. I re-opened the abdomen and found an extensive formation of adhesions and a dilated gall-bladder. I freed these, especially about the gall-bladder, and the patient is now in good health.

It is the danger of this formation of adhesions which makes a rigorous asepsis so essential in these operations.

I have dwelt thus at some length upon these possible defects or dangers of gastro-enterostomy because, as I have hinted, I think there has been of late, a tendency to slur them over. At the same time I gladly allow that accidents are decidedly rare. In the large majority of cases recovery is quite uneventful. One can generally count on having the patient able to leave his bed on the sixth or seventh day, and to go home at the end of a fortnight. The fact is, that as with medical treatment so with surgical, the number of fatalities is small, but more, many more, gastro-enterostomies must be performed for chronic gastric ulcer before one can decide to which belongs the greater risk. On the other hand, the ultimate result—the prospect of cure—is infinitely greater with than without, surgical intervention. I shall not attempt to follow out the solution of this problem further, but permit me to point out that the balancing of risks is, after all, only one factor, for the pain, the chronic ill-health and consequent incapacity for work are, under certain circumstances, matters equally important as life itself.

*Gastroptosis.*—I will conclude my paper with a description of a different class of case, which has not been so widely discussed as the others—*i.e.*, gastroptosis and gastric neuroses. Gastroptosis is by no means necessarily associated with a neurotic state. I saw four or five years ago a middle-aged woman who had a freely movable right

kidney and a dilated stomach. I fixed her kidney. About a year ago she came again to me owing to a return and increase of her stomach trouble. At the operation I found what appeared to be a tumour at the pylorus. I performed a posterior gastro-enterostomy, and soon afterwards re-opened the abdomen with the intention of excising part of the stomach, but the tumour had almost entirely disappeared! This patient wrote recently saying that she was in excellent health and free from her former distress.

Gastroptosis is, however, more frequently associated with a neurotic state, but the relation between them is not always the same. We may, I think, recognise two distinct groups. In one the gastroptosis is primary and has induced a neurotic condition in a predisposed individual; in the other the neurosis is primary and the gastroptosis is but a manifestation or result of the general muscular hypotonus, which is so striking a feature of neurasthenia.

That a disordered stomach may cause a disorder of the mind is a matter of common experience, but let me give an example. I saw some time ago a young man who for years had suffered from stomach disorder. He, so to speak, lived for his stomach, and gave up all manner of amusements. He was advised to ride a horse, and did so for his stomach's sake, and gave it up because it seemed to make him worse. He took his stomach for a trip abroad and brought it back as bad as ever. He gave up work in college and devoted his mental powers, which were above the average, to thought about his stomach. He consulted many doctors, and received every conceivable treatment—Weir-Mitchellism, electricity inside and outside of him, and I know not what besides. All with no effect. I found he had a large dilatation of his stomach with much splash, but there was no visible peristalsis. I performed a gastro-enterostomy, and since then he has improved in a striking

manner. He has resumed his college course, takes an interest in the world again, and will, I have no doubt, become a useful member of society. The result in this case seems to show that the gastrectasis, not the neurotic state, was the primary fault. As a fact, at the operation I found evidence of inflammatory changes, for the wall of the stomach was remarkably tough and there were posterior adhesions. My interpretation of the case is as follows :—I believe that the disease had its origin in an attack of measles, which immediately preceded the development of stomach symptoms. This may have caused a catarrh of the mucous membrane, and possibly a loss of muscle tone. As a consequence dilatation began. This, in a person with strong neurotic tendencies, induced the general neurotic state which, once established, tended to perpetuate the atonic dilatation, and thus a vicious circle was established.

In this case, gastrectasis, not gastroptosis, was the exciting cause of the neurasthenia, but I wish to suggest, as a general law, that operation is legitimate, and has a good prospect of curing a neurotic state if there is reason to believe this due to stomach ptosis or dilatation—*i.e.*, if the stomach lesion has preceded the neurotic symptoms.

As regards the second group, in which the gastroptosis is merely a part of a general nervous fault, I believe that operation is useless. I have had such a case under my care; I performed a gastro-enterostomy, and it has been a failure.

And now, gentlemen, I have kept you much too long. I hope what I have said has been of sufficient interest to arouse your criticism.

# THE SURGICAL TREATMENT OF TUBERCULAR DISEASE OF THE SEMINAL TRACT.

By LEVESON-GOWER GUNN, M.A., F.R.C.S.;
Assistant Surgeon to the Adelaide Hospital.

[Read in the Section of Surgery, December 1, 1905.]

There are two classes of disease that must always be of interest to us—those that are very rare, and for this reason interesting, and those that are very common, for on our power of curing common ailments depends largely our measure of professional success. It is to a very common disease—namely, tuberculosis—that I wish to draw your attention for a short while to-night. The genito-urinary tract is often attacked by tubercular disease; in some parts of this system the diagnosis may be beset with considerable difficulty. In that portion of the system, the testicle, the cord, the seminal vesicles, and the prostate, to which I wish to call your attention to-night, the diagnosis leaves as a rule no room for doubt.

When the question of treatment arises there seems to be, on the other hand, considerable difficulty in selecting the best course to pursue; for this reason I hope that this paper, since it deals more particularly with the treatment of tuberculosis of the seminal tract, may prove of interest to you.

Tubercular disease may occur primarily in the kidney, the bladder, the prostate, the seminal vesicles or the testicle, or it may occur as a secondary deposit in any of these organs. The testicle is most commonly affected of all these. By testicle I mean both testis and epididymis, for the latter is more often attacked than the former.

There is an interesting difference between the primary and secondary infection of the epididymis by tubercle. In the primary, the disease is deposited in the tubules, and from its commencement is in connection with the lumen of the vas; in the secondary, the infection more commonly occurs in the connective tissue outside the tubules, and it may be months before the bacilli gain entrance to the vas. This has an important bearing on the extension of the disease from a tubercular epididymis.

In what direction does this disease spread from the epididymis? Into the body of the testicle itself, where inflammatory changes or the actions of toxins, or perhaps both causes, early in the disease, render the testicle functionless. The flow of seminal fluid along the vas is very slow, except during ejaculation, when the powerful muscular walls of the vas contract strongly; the tubercle bacilli are carried along in this sluggish stream and have many opportunities of infecting the walls of the vas before they reach the seminal vesicles, where they are stored for a time until finally discharged into the urethra.

The vas may be infected the whole way along. In early cases of its infection this commonly takes place at either end, that is, within an inch or two of the epididymis, or near its termination in the seminal vesicle; the cord between these two points may be quite normal, and so lead one to suppose that as the cord is healthy above a tubercular testicle therefore the disease has not extended up along the vas deferens.

In February, 1905, I saw a young gentleman who had had one testicle removed for tubercular mischief about two years before: the second testicle now had a similar deposit. The cord felt quite normal, and we hoped to be able to curette away the disease and save the testicle if there were no sign of infection spreading up to the seminal vesicles. Even after the cord was

exposed with its veins the vas felt normal, but the testicle was found to be too far involved to save it, and it was in consequence removed, the vas being separated from the rest of the cord at the same time. It then became apparent that the vas was not healthy; two minute nodules were situated in its wall about an inch above the testicle. As much as possible of the cord was removed, and inside the abdomen two more small nodes were found on the vas; rectal examination showed no sign of infection of the prostate or seminal vesicles, but I fear that this may show itself later on.

The disease often attacks the second testicle, and from here it may extend backwards along the cord to the seminal vesicle on the same side; or the reverse may occur, the second vesicle being infected from the first vesicle or the prostate, and from this the tubercle spreading to the testicle against the direction of the seminal flow. That infection can go in this direction we all know from cases, that are not uncommon, of sepsis spreading from the posterior urethra to the epididymis.

The age at which tubercle shows itself in the epididymis is from about sixteen to twenty-four; seldom after this, though deposits sometimes occur in infants.

The cause—injury is the most commonly assigned cause, where any cause at all is given. I think that a form of what I might almost call chronic injury is not without importance—I refer to masturbation. This is an unsavoury subject to discuss, and for this reason is ignored to a greater extent by most surgeons than it deserves to be. So often in taking the histories of severe cases of genito-urinary tuberculosis have I learned that the patient was a masturbator, and continued the practice after the first appearance of the disease, that I feel confident that masturbation has a direct bearing both on the causation and the spread of tuberculosis of the genital tract. Where only one testicle is affected, as a rule the surgeon will not

hesitate to remove the disease; in all probability to do this completely will necessitate the removal of the testicle. This loss is not a serious one from the patient's point of view, and the operation is often attended with the most satisfactory results. Sometimes this is not so, and later on the disease appears in the second testicle, or when the patient first presents himself both the testicles may be already infected. Under these circumstances general anti-tubercular treatment may be used, a partial operation may be done—*i.e.*, the disease scraped away as completely as possible—or a complete operation may be done and both testicles removed. Castration is a very serious operation from the patient's point of view, and unless his surgeon can promise him almost certain success as the result of the operation he will hardly submit to it, even though the testicles themselves are functionless. I have already called your attention to the fact that early in the course of the disease, be it in testis or epididymis, the function of the testicle is lost; it is, under these circumstances, useless to a patient, and a source of danger to him. If the disease has extended to the prostate, seminal vesicles or bladder, there is not much use in removing the testes and hoping that this may check the disease—for such hopes are not likely to be realised. This procedure has been often recommended, but I do not think that it ever stops the advance of the disease—indeed, I believe that it has the quite opposite effect, that in reality it lessens the resisting power of the prostate and vesicles to withstand the advances of the tubercle—for the removal of the testes leads to a gradual atrophy of these organs, and with this atrophy there will in all probability be a diminished power of resistance to disease.

Can the extent to which the disease has spread be definitely made out? In most cases it can. If the urine be

clear, if the bladder hold 12 to 14 ozs. without pain, if there be no frequency, in all probability the bladder is not infected.

Still, infection of the bladder sometimes occurs as submucous tubercles which may give rise to no symptoms; they can be readily seen through a cystoscope, and it is as well in all such suspected cases to examine the bladder by this means.

Infection of the seminal vesicles and prostate may give rise to similar symptoms to those of bladder infection, and here again it is advisable to make a cystoscopic examination. On the other hand, I have seen several cases of infection of both prostate and vesicles in which there were no symptoms beyond a slight feeling of weight in the perinæum, yet on rectal examination extensive disease of these organs could be easily made out.

Nodules in the prostate can be readily felt by the examining finger in the rectum, but the vesicles are harder to reach; fully distending the bladder with from 20 to 30 ozs. of an unirritating antiseptic lotion, and then placing the patient in the knee chest position, will be found of assistance in carrying out this examination.

I next wish to draw your attention to the course which this disease takes when the entire seminal tract is involved. I can best do this by describing three typical cases which have lately passed through my hands.

Case I.—In August, 1905, I saw a gentleman, aged twenty-five, years. He told me that five years before the left testicle became swollen and discharged pus through the scrotum for several months, and then was pronounced well; six months later the other testicle became enlarged, broke, discharged for six weeks, and then healed up. For a year all went well, then an abscess appeared in his right groin, which has never completely healed up. Four months ago the bladder became involved; there has been in-

creasing distress since then. His present condition:—His urine contains a quantity of pus, blood, and tubercle bacilli, he passes water every ten minutes day and night, pain always present, often very severe. There are tubercular nodules in each epididymis, in the prostate, and both seminal vesicles; the cords feel normal. The bladder is highly inflamed; tubercular ulceration has occurred in several places; the mouths of both ureters are patulous. The disease will almost certainly extend up to the kidneys if it has not already done so.

Case II.—A strong-looking man, aged twenty-eight years, was admitted to the Adelaide Hospital, under my care, in March, 1905. From the age of sixteen he has been a confirmed masturbator. At twenty he developed a small nodule in his left testicle; this was treated for some months with applications, and finally ceased to trouble him. Three years later a similar nodule appeared in his right testis; after a time this broke, and finally had to be scraped out. For two years after this he kept well, then the testis broke out again and symptoms of irritation at the neck of the bladder began to show themselves, and pus appeared in the urine. A month before admission he was attacked by a pain in the region of his left kidney; this pain has never since left him. He has great pain passing water; this he has to do every few minutes during the day and about every half hour through the night; the urine is foul, contains a considerable amount of pus; tubercle bacilli are present. There are tubercular deposits in both testes, in the right vas, and in both seminal vesicles; the lower end of the left ureter can be felt much enlarged, the left kidney is swollen and tender. The walls of the bladder are inflamed, and in places ulcerated; the mouth of the left ureter is wide open; from it pus is coming. The left kidney and ureter are infected in this case.

Case III.—A soldier, aged twenty-six years, admitted to hospital, under my care, in January, 1905. Patient was a confirmed masturbator until about the age of twenty. When twenty-one, while serving in Egypt, a small tubercular nodule developed in his right testicle; it gave him no pain or inconvenience, and was not treated. Two years later, while serving

in South Africa, the other testicle became affected; he was sent into hospital, where the testis was removed. In six weeks he was back on duty again, his health during the whole time being excellent. Two years later bladder symptoms began to come on—pus appeared in the urine, pain became severe, and finally he was invalided from the service. When I saw him his condition was pitiable; the right testicle, vas, both seminal vesicles, and prostate were infected; there was extensive ulceration in the bladder; from the right kidney a quantity of pus was coming; the kidney itself was much enlarged and tender. The left kidney was also painful, and the urine coming from it contained pus; the urine was voided every few minutes—it contained numbers of bacteria, and among them tubercle bacilli.

To try and relieve the intense pain in the right kidney I drained it from the loin—it was a mere bag of foul pus; this drainage gave temporary relief. He was moved to the Rest for the Dying, and died there some two months later.

These three cases have many points in common. I could find no sign of tubercular disease outside the genito-urinary tract. In each the deposit in the testicle was, I think, primary; this was followed by the infection of the vesicles, prostate, and remaining testicle at varying intervals. From this the disease spread to the bladder. In Case II. it had reached one kidney; in Case III. it had destroyed the kidneys, and finally put an end to years of suffering. I fear that the same fate is in store for Cases I. and II.; treatment may delay, but will hardly prevent, a similar termination.

The disease occurred in otherwise healthy young men, who all had surgical advice and the means to carry out the treatment ordered. In the worst case the disease developed while the patient was in Egypt and South Africa, both climates which should have helped to stay its progress. These three patients would have submitted to any operation, no matter what mutilation it might entail, if it would relieve their pain, even if it did not cure; but beyond

draining the kidney in the one case, I did not see that any operative interference was justifiable. I have given these cases in some detail, for they are, I think, typical of their class, and because they have left a vivid picture on my mind of the course and termination of this disease.

Of earlier cases occurring during the past five years, in which both testicles and prostate or seminal vesicles were infected, some I have been unable to trace; but in all those that I have been able to follow the disease has progressed from the seminal tract to the bladder, and from there has infected some vital organ, eventually causing death. I may have been unfortunate in the cases which have come under my notice; they have compelled me to believe that the ordinary methods of treating this form of the disease, such as open air, dry climate, forced feeding, &c., combined with partial operations, such as scraping away the tubercular deposit from the testicle, are of little avail in checking its course, and offer small hope of cure to the patient.

In January, 1905, a young man, aged twenty-two years, was admitted under my care at the Adelaide. From the age of fifteen he had constantly masturbated; he attributed all his troubles to this vice. Three years before his left testicle became swollen and painful. This swelling passed off, leaving a small hard nodule in his epididymis. This nodule gave him no further trouble. Three months before admission his right testicle began to swell up, broke, and pus came away. On admission there is a hard tubercular node in his left epididymis; the vas above this feels normal. On the right side the whole testicle and epididymis is tubercular; a sinus leads to the former, from which pus is coming. The vas above feels as thick as a lead pencil right up to the inguinal canal; with a finger in the rectum the vas on the same side can be felt still thickened as it passes into the prostate; the vesicles and prostate itself feel normal. Urine is normal.

Cystoscopic examination of the bladder shows it to be quite

healthy. I advised the removal of the right testicle, and, if possible, the whole of the vas. This I tried to do by following up the vas into the inguinal canal, the floor of which I opened, dividing the deep epigastric artery. I could not get the entire vas away through this anterior incision, and left behind about an inch of it. I left in a small drain, but nothing came away, and the wound healed in ten days.

On his discharge from hospital the patient was given orders to report himself to me once a month in case of further infection taking place. He did not come for three months. One end of the wound had opened and was discharging tubercular pus, evidently from the remains of the diseased vas; the remaining testicle and cord showed signs of fresh infection, and tubercular nodules could be felt in the prostate and both seminal vesicles. There was, in fact, active disease of the whole seminal tract. The urine remained normal, the bladder was healthy, but I could see the swollen right vesicle bulging up into the base of the bladder. I felt that the only treatment that offered a reasonable hope of success was the removal of the whole of the disease. The remaining testicle was useless and should be removed; with it should come both cords, vesicles, and prostate, if this could be done without great risk to the patient.

There are three different routes by which the vesicles may be reached—Zuckerkandl's, by a perineal incision; Kraske's, by removing portion of the sacrum, pulling the rectum to one side, and so exposing the base of the bladder; and Young's, who by a large T-shaped incision through the lower part of the abdominal wall dividing both recti muscles gets at the bladder in this way. Of these three the first is the simplest and much the least severe operation. I tried this operation several times on the cadaver, but found it exceedingly difficult to reach the vesicles by this method. I looked up some recent works on genito-urinary surgery to see what advice they gave as to the removal of tubercular seminal vesicles. The information they contained was not altogether encouraging.

Watson Cheyne says:—"Some surgeons have performed elaborate operations for the removal of tubercular seminal vesicles before suppuration has taken place. It is doubtful, however, whether an operation of this kind should ever be performed, as it must be very extensive and the affection is usually secondary and therefore does not warrant it."

Lydston says:—"Many of the radical operations performed on the prostate and seminal vesicles for malignant or tubercular disease are, in the author's opinion, absolutely unjustifiable. The operator displays brilliancy of technic and boldness of surgical enterprise, but no other ends are conserved."

Taylor says:—"In the vast majority of cases, operative treatment is not to be thought of, unless suppuration has occurred in the sac, when its contents must be evacuated through a perineal incision, the cavity cleaned and packed with iodoform gauze. These patients should be sent to a suitable climate and receive the regular treatment for tuberculous subjects."

In spite of these remarks, I still felt that an attempt should be made to remove the disease from my patient. I decided to follow the steps of Young's operation for perineal prostatectomy, hoping by the use of his tractor to bring the vesicles well within reach. I do not intend to describe the steps of the operation, as this was admirably done by Mr. Arthur Ball at this Academy last session, a full account of which appears in last year's "Transactions." The two dangers I feared were that in separating the adherent seminal vesicle from the bladder I might injure the ureter; the other, that the veins surrounding the vesicles and prostate might cause dangerous hæmorrhage. As a precaution against the second, I gave the patient drachm doses of chloride of calcium night and morning for three days before the operation. Whether this had any effect or not I cannot say, but the amount of blood lost during the operation was very slight. I removed the testicle and as much of the cord as I could from

the front, then, closing the inguinal wound, I removed through the perinæum the ends of both vasa deferentia, vesiculæ seminales, and the prostate.

I had no great difficulty in separating the upper part of the right vesicle from the ureter, but the portion near the prostate was firmly attached to the bladder wall. Either I used too much force with the tractor or had gone too deeply, for the blade of the instrument perforated the bladder wall where the vesicle had been attached to it. I made no attempt to close this opening, but passed into the bladder two No. 12 catheters, one through the urethra and the second through the perineal wound, and packed firmly round this perineal drain with iodoform gauze. The gauze plugs were removed on the second day, the perineal tube on the fourth day, the urethral catheter on the seventh day, and on the eighth day the patient was allowed up. He had then no difficulty in passing water, perfect control over the bladder, and no leakage from the perineal wound; on two occasions later on some slight leakage occurred from this wound, but did not last for more than a day, and since then the wound kept dry and healed well.

Six months later I examined this case. His bladder was quite healthy, the wound at the side of the trigone was firmly healed, urine normal, no return of the disease can be felt by the rectum, his general health is good. He has put on over a stone weight since his operation. I hope that this case is cured.

In August, 1905, another case of the same kind came under my care, with the exception that he was younger—only aged nineteen years—and that the one testicle was removed about a year before the disease appeared in the second. The cases were almost the same, and I will not weary you with what would be almost a repetition of the case I have just described to you. The vesicles were not adherent to the same extent, and came away without any injury to the bladder wall.

The perineal wound was slower in closing up. The boy was up on the eighth day, and had perfect control of his bladder from this on; yet for nearly a month there was a

slight leakage of urine through the perineal wound every time he passed water. By the end of September he was able to resume his work, and has since kept quite well, and is putting on weight.

It is much too soon to say there will be no recurrence of the disease in this case, but his condition leads me to hope that he also is cured. The entire operation did not exceed in either case forty-five minutes. This time included the removal of the testicle and cord by an inguinal incision, and the prostate and vesicles by the perineal. There was no shock in either case, but each patient received a saline transfusion before he left the operating table.

In conclusion let me recall to you a few important points:—(1) That infection may readily pass along a normal vas to the vesicle or prostate; the fact that the vas above a diseased testis feels healthy is no proof that the tubercle has not extended to the vesicles. (2) That when both testicles and seminal vesicles are infected radical treatment alone is likely to be followed by success. (3) That where the disease is confined to the seminal tract it can be completely removed, and that without any great risk to the patient. (4) That in all probability the patient is functionally no worse after such an operation than he is after a partial operation on both testes.

My thanks are due to Mr. Gordon, who assisted me at the first operation, to Mr. Heuston, who helped me at the second, and also to Professor Dixon for much help and advice in the anatomy of this seminal region.

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Mr. Edward Taylor believed that the usual treatment of tuberculous disease of the testes by operation was very imperfect, a much more extensive procedure being generally requisite. It was almost certain that by the time the disease was fully

manifest in the epididymis more distant parts of the seminal tract were also implicated, although the fact might be difficult to prove by the ordinary methods of examination.

Mr. Haughton stated he had performed two radical operations on such cases, but found he could not get good access to the seminal vesicles by the abdominal route. He wished to know from Mr. Gunn if he had experienced much difficulty in removing the entire seminal tract.

Mr. C. A. Ball alluded to the fact that cases were occasionally observed in which tuberculous disease of the seminal tract seemed to stand still for a considerable time. He had known of one case in which the disease had involved the deep urethra, and had ultimately healed up, leaving a stricture.

Mr. Gunn, in replying, dealt in more complete detail with the steps of the operation for removal of the seminal tract. He first exposed the vas by means of an inguinal incision, and traced it into the pelvis up to the point at which it was crossed by the ureter. The second stage of the operation consisted in exposing the prostate, as in perineal prostatectomy, and working backwards towards the seminal vesicle and terminal portion of the vas. If the latter was diseased its complete removal should be attempted, but if it appeared healthy the perineal stage of the operation could be deferred to a later date.

# NOTE ON THE STERILISATION OF HANDS.

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AND

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[Read in the Section of Surgery, December 1, 1905].

A year ago I had the honour of bringing under the notice of this Section some remarks on the value of aseptic technique, in the course of which I referred to the "sterilisation of skin" as the weakest link in the chain of asepsis. Reference was made to a series of investigations on this point which I have been carrying out during the past few years, and my communication to-night with my colleague, Dr. Rowlette, is a further contribution to the subject.

During the last few years much attention has been directed, at home and abroad, to skin disinfection, by many workers—amongst whom I would mention Kocher, Mickulicz, Ahlfeld, Fürbringer, and Leedham Green—and the general consensus of opinion seems to be that while there are several good methods the *best* is the "*soap-hot-water-alcohol*" method. My previous experiments confirm this view, but as my own skin shows some intolerance to alcohol, during the past twelve months I have devoted attention to the "*soap-hot-water-sublimate*" method in aqueous solution. My object in so doing was to test thoroughly the *efficiency* of *one single method* when applied to a number of different pairs of hands, under the varying conditions of one's assistants, residents, and

nurses, rather than to try a number of different methods, the results of which would necessarily be of less value from the more limited application.

The results of this method Dr. Rowlette will tell you from the bacteriological standpoint.

Clinically speaking, I am satisfied the method is good, and, in my own experience, equally good with the "*soap-hot-water-alcohol*" method, as tested by:—

(1) Primary adhesion of wounds.

(2) The small amount of resulting scar tissue.

(3) Absence of pain or other signs of inflammation.

(4) Absence of the train of symptoms we call "shock" (surgical).

(5) The rapid return of a healthy appetite, even after major operations, which I generally gratify fully on the third day.

Of course different methods may yield equally good results, as exemplified in the practice of different workers, and I am prepared to admit that special methods may suit individual operators, which leads us to consider the "personal factor" in individual skins. But it is our duty as surgeons to seek for *the method* which, with the widest application, yields the most consistent and best results. And it is further our duty to have the courage of our convictions, and frequently subject our own methods to the searching light of bacteriological proof.

The "personal factor" in skins is, in my opinion, not sufficiently regarded, and includes such considerations as:—

(1) Abstention from touching septic surfaces, except through the medium of rubber gloves.

(2) The *appreciation* of the meaning of *cleanliness*, and the *mechanical capacity* of scrubbing every part as clean as possible.

(3) The personal health and texture of a particular skin, which varies enormously in different individuals. Some skins being able apparently to keep themselves comparatively sterile, while others harbour bacteria at all times. This, I believe, accounts for the good results sometimes obtained by methods of preparation which appear insufficient and even careless.

(4) *The rate of sweating* (both sensible and insensible perspiration). Skins *which remain dry* under the trying strain of heated and moistened theatre air, to say nothing of the mental strain of anxiety, have an enormous advantage as regards duration of comparative sterility.

(5) The nature of *skin surface.* If this be *soft and smooth*, which, of course, betokens health, and implies a healthy reaction to bacterial invasion, it is much easier to disinfect. The use of any antiseptic or chemical poison is liable to produce dermatitis; and no matter how healthy a skin may be, if many operations have to be performed, especially daily operations, it is only a question of time and frequency when the skin must give way, more or less, under the strain of a summation of stimuli.

It is to such skins especially that aseptic technique and rubber gloves are in the highest degree advantageous.

Our method of preparing the hands is:—

(1) Scrubbing, from fifteen to twenty minutes by clock, in very hot water with soap and nail brush. A battery of nail brushes is boiled for twenty minutes, immediately before and after use, and stored in the interval of using in a boiled tray containing 1-500 sublimate solution. The scrubbing must be very thorough and painstaking, visiting every particle of skin of fingers, nails, hands and forearms *seriatum* several times. There is a very considerable difference in the "personal equation" of each individual in carrying out this, and most of the success of the method

depends on thoroughness. A stream of running water is preferable to a basin, and if the latter must be used, several changes of water are desirable.

(2) Then the hands are plunged into and rubbed with a solution of 1-500 sublimate in a boiled bowl for one to two minutes.

(3) Next they are rinsed in a boiled bowl of sterilised normal saline to free them from sublimate.

(4) They are put into long rubber gloves, which have been boiled for five to ten minutes, and placed in a boiled bowl of sterile normal saline.

(5) The gloved hands are then steeped in sublimate 1-500 for four to five minutes, which is rinsed off just before commencing operation in another bowl of sterile saline. This is done to preserve the wound from the entrance into it of any chemical poison.

*Air-borne infection* of the gloves during operation is met by washing gloves every fifteen to twenty minutes in sublimate 1-500, which is again rinsed off in normal saline—two bowls containing these solutions being placed on tables at the operator's and assistants' elbows for frequent and ready use.

Dr. Rowlette will describe to you the results of our tests carried out at various stages of this preparation. As I have already stated, the clinical results of my practice of this method are exceedingly satisfactory.

The prolonged scrubbing removes a considerable amount of dirt and epidermis containing bacteria, and apparently arrives at a layer of skin less highly charged with bacteria. The sublimate disinfects and somewhat hardens this layer, and the rubber gloves in our experiments maintain an unbroken aseptic surface throughout the longest operation.

The results of our experiments confirm the generally accepted view that sterilisation of the skin is difficult or

impossible, and when obtained is not permanent, which is the strongest possible argument for the use of rubber gloves.

In considering the various methods of testing sterilisation of skin hitherto adopted we came to the conclusion that they did not satisfy us, because they were not sufficiently stringent. They did not satisfy what may be termed "service conditions"—that is, the condition of an ordinary operation. The superficial area of skin examined was too small, the nails were not searched deeply enough, or the conditions were artificial.

We, therefore, adopted a method, which Dr. Rowlette will describe, in which all ten fingers are examined, back and front, besides back and front of hands and wrists, and all ten nails are examined deeply.

If, therefore, our experiments show a relatively high percentage of positive results in bacterial growths, it must be borne in mind that our test is one of the *most stringent* yet put forward, and that in estimating results we aim at an *absolute standard* of sterility and not a comparative one in which a certain arbitrary number of bacterial colonies are considered as a practical proof of sterility. These facts, we believe, speak for themselves.

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By Dr. Rowlette.

In deciding on the tests by which to estimate the efficiency of the method of disinfection which has been described, our endeavour has been, on the one hand, to employ such tests as would approximate, in their severity, to the conditions met with in the course of surgical operation, and, on the other, to avoid any test which might be considered unduly artificial. We have thought it important, more-

over, to subject the hands of the assistant and of the aseptic theatre sister to the same tests as we applied to the hands of the surgeon, both on account of the practical importance of controlling every source of infection, and because we were thereby able to test the method on a larger number of different skins.

The actual method adopted has been as follows:—At the end of fifteen to twenty minutes' washing in soap and water, swabs sterilised by boiling in water for at least ten minutes, and then squeezed by the hand to be tested, have been rubbed along the entire length of the hand and fingers, front and back, of each hand, covering a surface of about 80 square inches, and the swab then smeared over the surface of sterilised agar in a culture tube. This was repeated on the three pairs of hands. A stout platinum wire, sterilised by heat, was then dragged under each of the ten nails, the skin being drawn away from the nail, and a culture tube of agar inoculated therewith. When the hands had been subjected to the sublimate lotion, and well rinsed in saline solution, the same process was repeated.

As soon as the gloves had been drawn on, their outer surfaces were rubbed with swabs in the same way. This served both as a test of the sterility of the gloves and as a control on the other experiments. At the end of operation, with the gloves in actual working condition, cultures were similarly made. When the gloves were removed the hands were again tested as before by swab-cultures. These tests seem to us as severe as any used by other investigators, and much more severe than those used by most, while at the same time they produce conditions similar to those to which the hands are subjected in actual operative work. In this manner close on two hundred observations were made, extending over a period of six months, and

covering several changes in the assistant, and some changes in the sister employed.

We give here percentages of the results obtained at each stage of the proceedings, summing together those from the three pairs of hands:—

After washing in soap and water alone growths from swabs occurred in 56.6 per cent.; and from nails in 79.3 per cent. After the use of sublimate lotion growths from swab-cultures from the hands appeared in 13.3 per cent.; and from nails in 66.6 per cent. From the gloves when first put on growths occurred in not a single case. From the gloves at the end of operation, growths occurred in one case only. Swab-cultures from skin of the hands at the end of operation gave growths in 62.5 per cent.

The operations occupied very varying lengths of time—the shortest taking 35 minutes, and the longest 1 hour 55 minutes.

In most cases only one organism was found in the growth, though in a few tubes two different organisms occurred. The following were identified, as far as cultural and morphological characteristics go:—St. p. albus in 68 per cent. of all growths; st. p. aureus, 11 per cent.; st. citreus, 5 per cent. The other organisms found included a diplococcus resembling diplococcus pneumoniæ in 3 per cent., and various common non-pathogenic air organisms. The cultures were incubated for at least seven days before final examination.

In studying these results one is first struck by the fact that whereas the use of sublimate solution apparently reduced the infectivity of the surfaces of the hands considerably (56.6 to 13.3 per cent.), it only reduced that of the nails slightly (79.3 to 66.6 per cent.). This, I think, may be explained by the fact that dirt embedded under the nails is very difficult to reach by any antiseptic fluid

or mechanical process of cleansing. The antiseptic probably coagulates the superficial layers of dirt, leaving the under layers unaffected.

Moreover, it is to be remembered that it is difficult to be sure that the sublimate is entirely rinsed off the hands by the saline solution. If any remain, some of it may be absorbed by the swab, and the growth of organisms present may be inhibited. The fact that in one case only was any germ found on the gloves at the end of operation shows how effective a protection sterilised gloves constitute. It is to be noted, too, that in many cases gloves, apparently intact, were found afterwards to contain a few minute punctures, so that the swab taken at the end of operation must have absorbed at least a little fluid from inside the gloves. It will be noticed that the infectivity of the hands (62.5 per cent.) on removal of the gloves was slightly above that after the simple washing in soap and water (56.6 per cent.), and considerably above that of the hands immediately after the use of antiseptics. We are of opinion, however, that the examination of the skin of the hands by swabs, or indeed by any of the methods devised, while the epidermis is possibly sodden with antiseptic fluid, is fallacious. The increase in the infectivity of the surface of the skin during operation is, of course, due to organisms working their way, by means of sweat or otherwise, from the deeper layers to the surface.

Various minor points of interest were noted during the conduct of these experiments. Thus, any marked unevenness or irregularity of the skin in any of the subjects examined meant that disinfection was more difficult. During the early part of the series one of the subjects suffered from a wart on the palmar surface of a finger, and while this persisted swabs almost invariably gave positive results. On one occasion the period of washing in

water was shortened to 5 to 10 minutes, with a markedly increased percentage of positive results.

It is not the purpose of this note to discuss the subject of sterilisation of the hands as a whole, but it is necessary to point out the bearing of our experiments on current opinions. It seems to be now generally admitted that absolute sterilisation of the hands is impossible, and we find various investigators laying down arbitrary standards of the maximum number of colonies which they consider to fall within the limit of "practical sterility." The futility of any such standard need hardly be pointed out, depending as it does on individual methods of testing impossible to standardise, and on an entirely arbitrary numerical limit. Our aim, on the other hand, has been in each case to decide whether absolute sterility has been attained, as, if not, there is no guarantee against infection. Our experiments, as far as one method of disinfection goes, show that sterility is unattainable in more than half the cases, and that even where the surface is at first apparently sterile, prolonged sweating brings to the surface a large number of bacteria. This same fact has been proved with great care by Dr. Rupert Collins, who showed the enormous increase in the infectivity of hands when subjected to prolonged sweating produced by the injection of pilocarpine.

We think, then, that we are justified in concluding:—

(1) That washing in soap and water for 15 to 20 minutes, and in sublimate lotion 1-1000 for two minutes, does not guarantee sterility of the hands.

(2) That during the course of an operation bacteria previously buried are carried to the surface.

(3) That rubber gloves offer a sufficient and practically complete protection.

# STERILISATION OF THE HANDS.

By R. ATKINSON STONEY, M.B., B.Ch., F.R.C.S.;
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[Read in the Section of Surgery, December 1, 1905.]

About this time last year I was led to start some experiments on sterilisation of the hands in order to prove the necessity, or otherwise, of wearing gloves while operating. Although many operators, who have accustomed themselves to the use of gloves by constant and prolonged practice, state that they can work quite as well with gloves as without, still, it will be admitted by everybody that, if the hands can be made sterile before operation by a short and simple process, and remain so during the operation, however long it may last, there is no need for the wearing of gloves in ordinary aseptic operations. On this subject Kocher says, "No one can deny that these (rubber) gloves have their disadvantages."

The object of my experiments was to determine if it was possible to make the hands absolutely sterile, and, if not, whether the organisms remaining were pathogenic or not. It is, of course, generally accepted that the superficial layers of the skin can be sterilised, but that is not sufficient, as during the progress of a long operation the surface layers of the epidermis are rubbed off and the deeper layers exposed. The question is, therefore, can the deeper layers be sterilised? If not, what organisms remain? With most experimenters, the fact of any growth occurring in their culture media has been considered sufficient to prove that the method of sterilisation was inefficient; but I considered that it was quite possible that any organ-

isms remaining in the deeper layers of the skin might be of a non-pathogénic variety, and might, therefore, be considered harmless, so that a method of sterilisation, which, theoretically, was not efficient, might yet practically be all that could be required; in fact, the presence of non-pathogenic bacteria does not necessarily imply the presence of bacteria which are pathogenic. One point I particularly desired to find out—namely, the danger of infecting sterile silk ligatures while tying them. This has been considered by many people one of the most probable methods of infecting wounds, if gloves are not worn, so much so that some operators recommend that the tying of all ligatures should be left till the end of an operation, and that gloves should be worn at least while this is being done.

The methods employed by various experimenters in order to test the sterility of the hands are almost innumerable, and differ widely in their stringency. One extreme is the removal of a piece of skin and the placing of it in the culture medium, and the other extreme the mere stroking of the dry hand with a fine platinum wire or a swab of cotton wool. It is probably largely owing to the difference of procedure adopted that the great divergence of results has been obtained by different workers in this field.

To my mind, the stringency of the test cannot be too great, as in many operations where the finger is freely used in dissecting or separating adhesions, and especially in operations on bones, considerable force has to be used, and the superficial layers of skin are very liable to be rubbed off. I therefore made all my tests as stringent as possible. The following is the method adopted:—

Eight tubes were taken, four of broth, and four of agar-agar. These were divided into two sets, marked A and B,

each consisting of two tubes of broth, marked 1 and 2, and two of agar, marked 3 and 4. In the first place, a small piece of skin was snipped off the palmar surface of the tip of one of my fingers and placed in the tube labelled A 1. In the second place, a piece of sterilised silk, about 2½ inches long was taken, and on this a knot was tied, twisting the ends round my fingers, and using sufficient force to cause the silk to press deeply into the skin of the fingers (considerably more force was used than would be employed in tying any ligature in the course of an operation). This was then placed in the tube marked A 2.

A blunt-pointed instrument (probe or director) was then taken and scraped along the dorsum and palm of the hand and fingers. With this the agar tube A 3 was smeared. After sterilisation in the flame, the same instrument was used to scrape under the nails of one hand, and with this the tube A 4 was smeared. The tubes marked A were inoculated in this way after sterilisation of my hands, and the tubes marked B were inoculated in exactly the same manner, after I had been operating for periods varying from half an hour to two hours, without any further efforts at sterilisation beyond an occasional rinsing of the hands in a basin of sterilised water.

The following was the method of sterilising the hands:—(1) Scrubbing with a sterilised nail-brush in hot water (as hot as could be borne) with carbolic soap for five minutes, several changes of water being used; (2) rubbing thoroughly with sterile gauze wet with methylated spirit; (3) immersion for one minute in a watery solution of biniodide of mercury (1-500). The whole process did not occupy more than ten minutes.

In every case hands, instruments, silk, &c., were rinsed in sterile water in order to remove any excess of antiseptic which might, by its presence, interfere with the growth

of organisms in the culture tubes. In all cases the hands were tested while wet, and sufficient force was used both with the silk ligatures and scraper to remove a visible amount of epithelial *débris*, which was transferred to the culture medium.

After the first few experiments I found that the number of infections obtained with the silk were so numerous, and out of all proportion to the rest, that I began to be doubtful if the silk was properly sterilised. I therefore tested it, and found that it was not sterile, probably owing to the fact that it was wound too tightly and thickly on reels, and was then boiled for an insufficient length of time. A new method of sterilising the silk was then introduced, and since then a piece of untouched silk has always been rinsed in sterile water, and placed as a control in a tube of broth. In both the first and second series of experiments this silk has only once given rise to a growth, and then it was a sporing bacillus, the infection having probably occurred through the air or through the water in which it was rinsed.

Omitting the tubes of silk infected in the experiments where there was no control made, there were 81 tubes tested, and of these nine were found to be infected—one with staphylococcus aureus, five with staphylococcus albus alone, and three with staphylococcus albus and bacilli. There was no case of infection from the skin snips of the fingers taken after sterilisation and before operation. In the case of the skin snips taken after operation, there were three infections; two of these occurred before the silk was tested, and on each of these occasions the silk tubes were also infected, so that it is quite possible that the skin may have been infected while tying the silk. In the other case the infection might have occurred from the patient's skin, or from the air. That it was not a true infection of the

TABLE SHOWING RESULTS OF FIRST SERIES OF EXPERIMENTS.

| No. of Experiment | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 1 | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile |
| | 2 | ,, | ,, | × | × | × | ,, | Staphylococcus albus | ,, | ,, | ,, | ,, |
| | 3 | ,, | ,, | Sterile | Sterile | Sterile | ,, | Sterile | ,, | ,, | ,, | ,, |
| | 4 | ,, | ,, | Staphylococcus albus | ,, | ,, | ,, | ,, | ,, | ,, | Staphylococcus aureus | ,, |
| B | 1 | ,, | ,, | Bacilli Staphylococcus albus | Bacilli Staphylococcus albus | ,, | Staphylococcus albus | ,, | ,, | ,, | Sterile | ,, |
| | 2 | × | ,, | × | × | × | Sterile | ,, | Staphylococcus albus | ,, | ,, | Staphylococcus albus and Bacilli |
| | 3 | Sterile | ,, | Sterile | Sterile | Sterile | ,, | ,, | Sterile | ,, | ,, | Sterile |
| | 4 | ,, | ,, | ,, | Staphylococcus albus | ,, | ,, | ,, | ,, | ,, | ,, | ,, |
| | | No control experiments with silk. | | | | | Control experiments with silk. | | | | | |

The results marked with a cross are those in which the silk tubes were infected before I started the control experiments.

deeper layers of the skin is supported by the fact that on the same days a similar piece of skin taken before operating gave no growth. In the case of this test, as the whole depth of the false skin is taken, there is no reason why the incidence of infection should vary according to whether the specimen is taken before or after operation, unless infection occurs during the operation, or unless more antiseptic is introduced with the first specimen put into the culture medium than with the second. As will be seen later, there is good reason to believe that the latter is not the case. It may be objected that this is not a fair test, since the organisms may be present in the portion of skin removed, but may be unable to get out into the culture medium and grow in it. This, however, I think, is not the case, for when the tubes were examined at the end of a week, in all cases the portion of skin had become so macerated that, on shaking the tube, the greater part of it broke up into fine particles, and in many cases the whole piece of skin disappeared, and was merely represented by a fine deposit at the bottom of the tube. In the case of the silk ligatures, three infections occurred, though on all these occasions the skin snips were sterile. This may be due to the fact that the infection was obtained from the lateral aspects of the fingers, which are less exposed to the cleansing processes than the palmar. Still I am more inclined to think that these were accidental infections, as in a further series of experiments which I undertook with this object in view, using the same method of sterilisation, there was no infection in 14 consecutive experiments.

In the case of A 3 and B 3, scrapings from the fingers and hands, there was no infection in the 22 experiments. In the case of A 4 and B 4, scrapings from under the nails, there were three infections, twice with staphylococcus albus and once with staphylococcus aureus. In the latter

case the infection was undoubtedly due to my own carelessness, for I found a small particle of what I may call "social dirt" under one of my nails, which was longer than it should have been.

We see, therefore, that staphylococcus aureus, which is certainly dangerous, and capable of producing suppuration, only occurred once, and then admittedly as the result of carelessness. The bacilli which occurred three times may be dismissed as being non-pathogenic, and therefore harmless. We are left then with eight cases of infection with staphylococcus albus. I shall not go into the disputed question of the pathogenicity, or otherwise, of this organism, beyond saying that I believe that, under favourable conditions, as the presence of blood-clot or dead tissue, it can produce suppuration.

I must confess that I was disappointed in the results of this series of experiments, and was forced to come to the conclusion that I had not yet found a trustworthy method of sterilising my hands. For although, from the above table, the incidence of infection appeared greater than it really was, there was no doubt that, although sometimes complete sterility of the hands was obtained by this method, still there was always a chance of the continued presence of staphylococcus albus on the hands, and therefore a chance of infecting clean wounds unless gloves were worn.

About this time I read a paper by Dr. Harrington,[a] in which he recommended a new fluid for sterilising the hands. The formula that he gave was as follows:—

| | |
|---|---|
| Alcohol 94 per cent. - - - | 940 c.c. |
| Hydrochloric acid (strong) - - | 60 „ |
| Water - - - - - | 300 „ |
| Corrosive sublimate - - - | 0.8 grm. |

[a] Some Studies in Asepsis. Charles Harrington, M.D. Annals of Surgery. October, 1904.

As the result of numerous experiments, Dr. Harrington claimed for this fluid great antiseptic power. I, therefore, started a new series of experiments, using this fluid in the preparation of my hands, which was as follows:— (1) Washing for five minutes with nail-brush and carbolic soap in several changes of water, as hot as it could be borne. (2) Soaking my hands for three minutes in a fluid of the following composition:—

| | |
|---|---|
| Commercial alcohol (90 per cent.) | - ℥ xxviss. |
| Hydrochloric acid (commercial) | - ʒ iiss. |
| Water - - - | - ʒ xi. |
| Corrosive sublimate - - | - gr. xvi. |

I took two tubes of broth and four of glucose agar. These I divided into two sets, labelled D and E, each consisting of one tube of broth and two of glucose agar, one of which was sloped. These were marked 1, 2, and 3. In 1, a piece of silk was placed, on which a knot had been tightly tied. In 2, a stab was made with a probe, with which the back and front of one hand and fingers had been vigorously scraped. In 3, a smear was made with a probe, which had been scraped under the nails of one hand. The tubes marked D were inoculated immediately after sterilisation, and the tubes E after operating for a variable length of time. The same precautions were taken with regard to stringency and prevention of any excess of antiseptics as in the first series of experiments. The following is a table giving the results:—

TABLE SHOWING RESULTS OF SECOND SERIES OF EXPERIMENTS.

| No. of Experiment | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | 1 | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile |
| | 2 | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, |
| | 3 | ,, | Sporing bacillus | ,, | ,, | ,, | ,, | ,, | ,, | ,, | Sporing bacillus |
| E | 1 | ,, | Sterile | ,, | ,, | ,, | ,, | ,, | ,, | ,, | Sterile |
| | 2 | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, |
| | 3 | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, |

(*Continued*)

| No of Experiment | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | 1 | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile | Sporing[a] bacillus |
| | 2 | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | Sterile |
| | 3 | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, |
| E | 1 | ,, | Sporing bacillus | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, |
| | 2 | ,, | Sterile | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, |
| | 3 | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, | ,, |

[a] In this case the control silk tube also grew a sporing bacillus.

In these experiments there was no case of infection with any of the staphylococci; the only four cases of infection which occurred were of a sporing bacillus, and one of these infections, that occurring in experiment 20, was on the occasion (alluded to above) on which the control silk tube also showed an infection with a similar bacillus. The number of infections then may be taken as three out of one hundred and twenty tubes. This bacillus is undoubtedly a non-pathogenic organism, and it is, therefore, immaterial where it came from, whether from the hands, or the air, or the water in which hands, instruments, and silk were rinsed. I say immaterial, because, being non-pathogenic, it does not in any way endanger the patient by its presence, and, therefore, its occasional appearance is no evidence of the necessity for using gloves. As I have said above, I do not hold with those observers who consider that the presence of any form of micro-organism shows the possible presence of others, as it is quite natural to suppose that all the pathogenic bacteria may be completely killed, or removed, by any given method of cleaning the hands, whereas non-pathogenic organisms, especially if they are spore-bearing, may not be invariably destroyed by the same process.

It might be thought that the antiseptic fluid would be unpleasantly strong and harmful to the hands; I found, however, that, though I used it several times a week for many months, it caused no inconvenience. At first it caused a slight exfoliation of the skin of the palms of the hands, but it did not lead to any cracking or roughening of the skin. This experience of mine entirely agrees with that of Dr. Harrington. The great advantage of this fluid in antiseptic properties appears to be due to the combination of the hydrochloric acid with the corrosive sublimate; this view is supported by an incident which occurred

during the course of these experiments. When sterilising my hands one day with this fluid I noticed that it did not appear to be so strong as usual, there being none of the usual slight smarting of the arms; however, I made the tests in the usual manner. On inquiry I found that the fluid had been made up with the dilute hydrochloric acid of the B. P. instead of the strong commercial acid. Of the tubes inoculated on this day, two grew staphylococcus albus. Except for the omission of this experiment, the results given in the above table are from a series of consecutive experiments extending over a period of nearly five months.

Of course, in all experiments to test the efficacy of any antiseptic for sterilising the hands, the possibility of the entrance of minute quantities of the antiseptic into the culture medium must be remembered, as, although the quantity may be very small, it may inhibit the growth of any organisms introduced at the same time. The prevention of this is a matter of the greatest difficulty, as there is no easy and satisfactory method of neutralising the anti septic used; this is true in the case of corrosive sublimate; the mere rinsing in sterilised water being a very slow and uncertain process. The method, suggested by Leedham-Green, of soaking the hands in a sterilised solution of ammonium sulphide has the great disadvantage of turning the hands black, which colour they retain until the stained layers of the skin are worn away. I did not, therefore, attempt this method. Instead I took great pains to carefully soak and rinse my hands, and everything that came in contact with the culture media, in sterilised water. The incidence of infection, as is seen in the above table, is also opposed to the idea that growth was prevented by the action of antiseptics in the culture media, as more cases of growth occurrred in the tubes inoculated immediately after sterili-

sation, when presumably there was a greater likelihood of some antiseptic remaining on my hands, than in those inoculated after operation, and therefore after a considerable time had elapsed since the sterilisation, no antiseptic being used on the hands in the meantime. The following fact also helps to establish this point. On different occasions I took the tubes of broth, in which no growth had occurred after being incubated for a week or a fortnight, and, having taken out the piece of silk, tied a fresh knot on it with unwashed hands and replaced it, or inoculated the broth by a platinum wire with which I had scraped my unwashed hands. In every case I got a luxuriant growth within two days. This proves that either the tubes were absolutely sterile, or, if not, the organisms they contained were so reduced in power that they were incapable of growth in a fluid which provided an excellent medium for the growth of ordinary organisms The former of these suppositions is, I think, the more likely.

In these experiments, all the tubes were left in the incubator for at least eight days, and in many cases for three weeks, but in no case did any growth appear later than the fourth day.

Most of these experiments were made on days on which I was operating on aseptic cases only, but, on some of the occasions, the operations were of a septic nature, as cases of tubercular disease with discharging sinuses, and cases of intestinal anastomosis. On these occasions, before inoculating the second series of tubes, marked E, I sterilised my hands, not, however, spending so long in the process as in the original sterilisation, contenting myself with merely soaking my hands for two minutes in the corrosive sublimate solution and then rinsing them in sterilised water; in the tubes inoculated on these occasions no growth ever occurred. The explanation of the results obtained in these

cases is, I think, simple. The hands once having been rendered sterile, any superficial contamination which afterwards occurs can be easily removed.

It is frequently stated that a man who engages in operative surgery should not have anything to do with the teaching of practical anatomy, or the demonstration of surgical operations on the dead body, or, if he does so, he should wear gloves while handling the corpse. With the present careful methods of preserving the bodies used for demonstration purposes this is not necessary. The experiments referred to above were spread over a period of ten months, and, during that time, I was almost daily engaged in demonstrating both anatomy and operative surgery on the dead body. The dressing of septic cases in hospital is, however, a very different matter, as here we are bound to come in contact with the very organisms from which we wish to keep our hands free; a great deal can be done by the exercise of a little care while dressing cases, so as to prevent the hands from coming into contact with any septic material, and by using forceps for the removal of soiled dressings, &c. Where the finger has to be used for purposes of exploration gloves should always be used.

One important point, on which I have not yet touched, is that the individual has to be taken into account in any scheme of sterilisation, both as regards the natural septicity of his skin and his tolerance of antiseptics. People vary very greatly in the ease with which their skin can be made aseptic. Those with a naturally coarse or greasy skin find it more difficult to sterilise their hands than others. Again, people vary greatly in the tolerance of their skin to powerful antiseptics, even weak solutions of some of the chemicals commonly used and alcohol causing their skin to become hard and cracked, or even ulcerated. For these

unfortunate people the wearing of gloves is a necessity if they determine to engage in surgical work.

The result of these experiments has confirmed my opinion that it is possible to render the hands sterile, or at least free from pathogenic bacteria, by a simple and short method. It is simple, in so far as it only consists of washing in hot water and then soaking in an antiseptic fluid, and is short, inasmuch as the whole process requires less than ten minutes. The wearing of gloves, therefore, during the performance of an aseptic operation is not necessary, though it is advisable in the case of those operators whose skin is either unusually difficult to sterilise, or easily injured by the constant use of antiseptics. I may perhaps be allowed to suggest that anyone who intends engaging in the practice of surgery would not find it a waste of time if he were to undertake a series of experiments for himself, in order to find a method of sterilising his hands which will suit himself, and ensure good results. The demonstration of practical anatomy and operative surgery on prepared bodies does not unduly increase the difficulty of sterilising the hands, and gloves need not, therefore, be worn during these demonstrations, though it may be thought advisable for purely cosmetic purposes. Where, however, an operator comes into contact with true septic material, as in dressing cases, *post-mortem* work, &c., gloves are necessary, and should always be worn.

In conclusion, I would mention that the bacteriological examination of all the tubes used in these experiments has been carried out by Dr. T. G. Moorhead, my colleague in hospital, and Demonstrator in Pathology in Trinity College, for whose advice and assistance in this work I am deeply indebted.

DR. T. G. MOORHEAD gave details of the bacteriological aspect of Mr. Stoney's investigations. On several occasions he found *débris* on the surface of the agar or in the broth, so that the test was stringent. As regarded incubation, all tubes were kept until the eighth day and some for a fortnight. When a growth was obtained it was plated out and the colonies examined.

MR. T. E. GORDON and MR. E. H. TAYLOR discussed the communications, and were in agreement as to the advisableness of wearing rubber gloves in operative work.

# REMARKS ON GASTRO-ENTEROSTOMY.

By R. CHAS. B. MAUNSELL, M.B. Univ. Dubl., F.R.C.S.;
Surgeon to Mercer's Hospital, Dublin.

[Read in the Section of Surgery, January 12, 1906.]

The operation of gastro-enterostomy has been prominently before the profession during the past ten years. Much has been written, and much spoken on the subject, so much, indeed, that some surgeons think that the last word has been said, at least for the benefit of our patients, and that further words will be more for the benefit of the surgeons. I do not acquiesce in this opinion, but think that there is much yet to be debated upon before this most useful procedure has definitely found a place with well-defined limits.

The literature of the subject being so voluminous, I will not discuss various methods of operation but merely the technique which I use in performing von Hacher's posterior gastro-enterostomy. Neither will I labour the indications, but will state that, in addition to the generally accepted indications, I have found most remarkable benefit follow where I have performed the operation for gastroptosis and gastrectasis, where, although there were no obvious signs of narrowing of the pylorus or of ulceration, yet examination of the gastric contents at various periods after test meals demonstrated the fact that there was distinct motor insufficiency. There can be no two opinions that by far the most immediate and most striking advantage follows in patients operated upon for definite pyloric stenosis; indeed, this fact has been so much impressed upon our American colleagues that many of them advo-

cate closing or narrowing of the pylorus when examination during operation discloses that it is patent.

We must not always look for sensational results, and intelligent treatment after operation will ensure just as lasting benefit in the other conditions which I have named. Before describing the operation I wish to draw attention to the great help in diagnosis and in determining our method of operative procedure which is gained by auscultation and auscultatory percussion over the abdomen and lower portion of the thorax, both before and after distension of the stomach by gas or air.

In operations upon the stomach the site and form of abdominal incision are of importance. The length of the primary incision must depend upon the size of the operator's hand.

I am totally opposed to the so-called exploration of the abdomen through an incision which will not admit more than one or two fingers, as I believe that this imperfect examination must lead to many a carcinoma being left *in situ* as inoperable, when a more thorough search might have stimulated the surgeon to attempt its removal. A patient who will consent to an exploration will not give up his last hope because it is proposed to make a three-inch incision instead of the little hole advocated by some writers upon this subject.

It is fairly generally recognised that the site of the incision for gastro-enterostomy should be to one side of the middle line, the rectus muscle being split or drawn aside. Most operators make the incision through the sheath of the right rectus above the umbilicus, but I think there should be no fixed rule, as when gastroptosis and gastrectasis are present an incision on the left side, the lower end of which lies below the umbilicus, will give much more direct access to the viscera we wish to expose.

In operations undertaken more for exploratory purposes, or in which there is a doubt as to what operation may be necessary, the ordinary median incision is much simpler and much more easily adapted to the varying requirements of a difficult case.

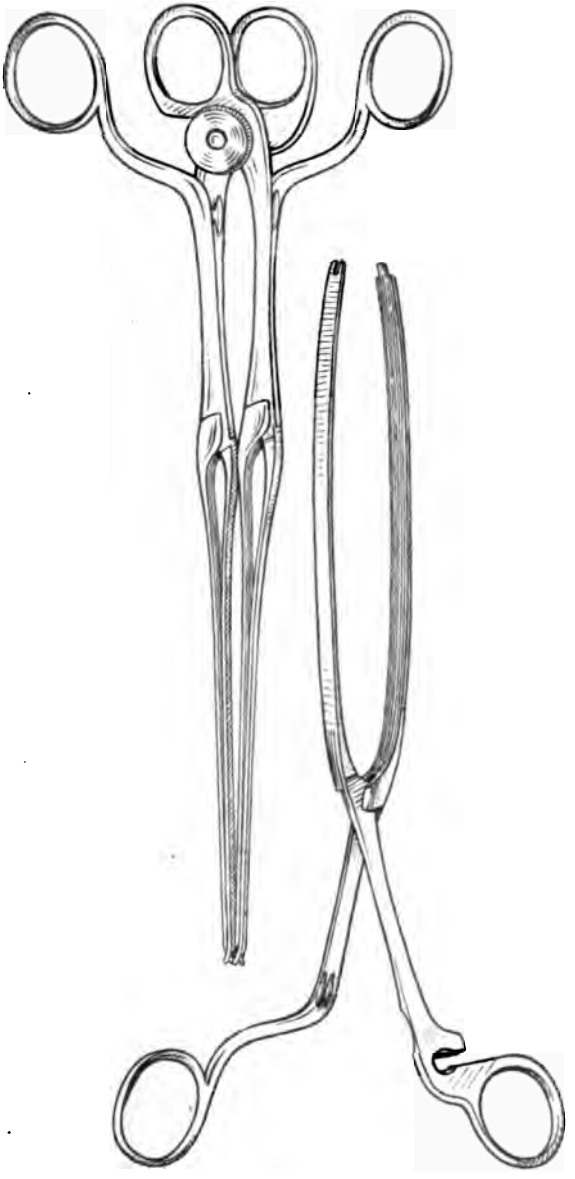
The points of importance in making the junction between the stomach and intestine are—(1) The form and position of the incision in the stomach; (2) the form and position of the incision in the jejunum; (3) the method of union; (4) the use of clamps.

The incision in the stomach should be two and a half inches in length, its direction oblique from above, downwards and to the right, its position in the pyloric end of the moderately dilated stomach or at the most dependent portion of a flaccid and much dilated viscus. In the jejunum the incision should be of equal length to that in the stomach, longitudinal and opposite the mesenteric attachment; its position will vary in each operation, as it should be at a place which will lie easily in apposition with the stomach without either leaving a loop below the flexure or being dragged upon when the dilated stomach resumes its dependent position. I have frequently heard and read directions given in terms of inches measured from the duodeno-jejunal flexure, and I am convinced that these definite directions account for many a "vicious circle."

The method of union which I adopt is by three separate rows of continuous No. 1 silk suture, the main blood vessels having been separately ligatured as soon as the peritoneal coat had been incised.

During the past few years I have always used clamps as an aid in the performance of this operation, and I have found them of inestimable value, as by their aid the work is extra-abdominal, only very small portions of stomach

and intestine are exposed, there is no chance of soiling by intestinal contents, and the need for manual assistance is almost abolished. The clamps which I have used until lately are those designed by Moynihan, but I consider that, useful as they are, yet they might be improved upon. The faults which I have to find with them are that they are too clumsy, and they must be held in position by an assistant. I have designed a clamp, which has been made for me by Messrs. Weiss & Sons, and which I have used in my last few operations, and I think it will prove useful to others as well as to myself. It is what might be called a twin clamp, and at first sight appears to be an enlarged Carwardine's intestinal clamp. On examination, however, you will see the peculiar interlocking points which keep the blades true when grasping a mass of tissue, the single slot which joins the two clamps together thus enabling the surgeon to separate them during the operation without unduly stretching the posterior rows of suture, and the fact that the forceps designed to grasp the stomach is almost twice as powerful as that designed to grasp the more delicate jejunum. The length of the blades is five inches, and that of the entire forceps nine inches. When these forceps are applied and locked together the parts are firmly held in the most exact position during the process of suturing the viscera. I find it better either to separate the two forceps, or, indeed, to remove them altogether, as soon as the three posterior layers and the first anterior layer of sutures have been introduced, as this allows of infolding of the parts without tension, and also because a clamp at this period of the operation has ceased to be of any assistance. These forceps may be used either with or without thin rubber tubing drawn over the blades. Personally, I have not found rubber necessary.



With regard to post-operative troubles and mortality we hear various statements.

The experience which I have gained from my own patients is that practically every patient vomits during the first few hours after the anæsthetic (ether). Most of these patients vomit a small amount of altered blood, more especially if a portion of the stomach had been rendered anæmic by the use of clamps. I have once seen a patient vomit sufficient fresh blood to cause anxiety—in this patient's case, however, clamps had not been used or separate ligature of the vessels performed. Many patients vomit bile during the first twenty-four hours; some show this tendency for a few days. I have had one experience of "vicious circle" in which I found the cause to be hernia of the jejunum through the opening in the meso-colon, and I was able to remove all symptoms by performing a lateral anastomosis between the two loops of jejunum. I am sorry to say that I have also seen one death in a patient who, but for a lack of judgment on my part, should have made an uneventful recovery. The particulars were as follow:—

Male, aged fifty-five, had periodical vomiting for many years; had been washing out his stomach every few days for two years. At the operation, a dense fibrous stricture of the pylorus was found, and a very much dilated stomach. Progress after the operation was good, except for complaint of a feeling of distension, until later in the evening of the second day, when repeated vomiting of small quantities of very much diluted bile and altered blood occurred. When I saw him next morning he was still vomiting, and rapidly passing into a collapsed condition, with very frequent pulse. Upon passing a stomach tube, several quarts of fluid similar to that which had been vomited were drawn off, but the patient never rallied, although copious injections of saline solution were given subcutaneously. *Post mortem* it was found that the junction had been made at the pyloric end of the stomach, and that the greatly dilated cardiac

end had sagged down full of fluid and completely kinked the new outlet, thus causing an acute intestinal obstruction. My mistake was that I had not rightly judged the position for the opening. It was unfortunate that in my absence some one did not wash out the stomach as soon as the vomiting assumed a continuous character and distension of the stomach became obvious. I believe that if this had been done the obstruction might have been relieved, at least for a sufficient time, to allow of operative rectification of the faulty junction.

I will crystallise my remarks on the treatment of these troubles as follows:—(1) If simple vomiting occurs wash out the colon and give nourishment by the rectum. If weakness ensue give subcutaneous saline injections. (2) For hæmatemesis of such amount as to need treatment give drachm doses of adrenalin chloride (1 in a 1,000 solution), if bile or other fluid is also present in the stomach wash it out with plain water before giving the adrenalin. (3) For bilious vomiting, wash out the stomach with plain water. (4) For "vicious circle" perform a lateral anastomosis.

In conclusion, I would say that the operation of gastro-enterostomy is one of the greatest blessings which has come to patients who suffer from chronic gastric disorders, but that it is not such a trivial operation that it should be advised until other methods of treatment have been fully considered and tried. I feel convinced, however, that where there are obvious signs of pyloric obstruction non-operative treatment is practically useless, and certainly no discussion as to possible medicinal treatment should be entertained if the symptoms suggest cancer, but all such patients should be immediately subjected to an exploratory operation.

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Sir Arthur Chance expressed himself in favour of clamps, and recognised the advantages of those designed by Mr. Maunsell.

In some of his cases vomiting did not occur at all after the operation. He referred to the advisability of suturing the proximal loop of the jejunum to the meso-colon with a view to prevent subsequent internal strangulation.

Mr. Blayney was not in favour of clamps, as he considered their use endangered risk of post-operative hæmorrhage. He had not known of any case in which dispensing with clamps had led to any untoward result through the escape of stomach contents or prolongation of the operation.

Mr. Jameson Johnston was in favour of clamps, and had not noted hæmorrhage in any of his cases. He considered it essential that the anastomotic opening should be free, and that the direction of the peristaltic wave in the stomach and jejunum should correspond. He admired the principles of Mr. Maunsell's clamps.

Mr. William Taylor had used clamps like those of Moynihan, but of a lighter build; he thought those of Mr. Maunsell were an improvement. He also thought hæmorrhage after gastro-enterostomy could be prevented if the sutures were properly introduced. He had seen one fatal case of vomiting due to the vicious circle.

Mr. Edward H. Taylor had been rather startled by hæmorrhage in one case after gastro-enterostomy, although he had used every precaution in the suturing process. At present his practice was, in making the gastric incision, to divide the muscular coats carefully and expose the principal vessels in the submucous coat, and suture them separately before incising the mucous membrane In some of his cases vomiting had not occurred once after the effects of the anæsthetic had passed away, and he had observed that those who did best in this respect were those in whom there was decided pyloric obstruction. Where the pylorus was fairly patent one was more likely to encounter post-operative vomiting.

Mr. W. S. Haughton said he had sometimes experienced difficulty in making a sufficiently large aperture in the meso-colon, and he would like to know if Mr. Maunsell considered it likely that the vitality of the colon would be dangerously affected by dividing some of the colic vessels. Instead of clamps on the stomach and intestine he used strong fixation sutures, which held the parts steadily in apposition and facilitated accurate suturing.

Mr. Kennedy said he had discontinued the use of the Murphy button in gastro-enterostomy. He had met with two cases of hæmorrhage where gastro-enterostomy had been performed some months previously; both recovered, however, under ordinary treatment.

Mr. Maunsell, in reply, said he had only meant to touch on a few points respecting the operation of gastro-enterostomy. His habit now was to suture the margin of the divided meso-colon along the line of gastro-jejunal junction. He always ligatured the larger vessels met with when incising the stomach. He did not think there was much likelihood of the peristaltic currents in the stomach and jejunum being reversed if ordinary care was taken. If he could not make the aperture in the transverse meso-colon large enough without tying vessels he tied them. The proximal jejunal loop should be long enough to enable it to be connected with the most dependent part of the stomach without tension. He considered that the vomiting was due chiefly to the anæsthetic.

# ON PARTIAL GASTRECTOMY FOR PYLORIC TUMOUR.

By WILLIAM TAYLOR, M.B. Univ. Dubl., F.R.C.S.;
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Surgeon to Cork Street Hospital.

[Read in the Section of Surgery, January 12, 1906].

My object in bringing forward this communication is not that of recording any personal triumph, but of eliciting a discussion which may be alike interesting and instructive.

The patient is a woman, aged sixty years, who was sent to me in the month of July, 1905, by Dr. Wessels, Assistant Master, Coombe Hospital. The history she gave on admission was that for about three years prior to this she had suffered on and off from pain in the abdomen, and stomach trouble of an ill-defined character, to which she applied the term "weakness." For the last three months of her illness she said the pain had become so aggravated as to compel her to lie with her stomach pressed against the sides of her bed, or to roll in agony upon the floor. During this period she was quite unable to make use of anything in the form of food. Everything she ate was vomited very soon after. The vomited matter was generally frothy, and consisted principally of what she had recently partaken, but on several occasions during the few weeks immediately preceding her admission to hospital the vomited matter was dark—as she termed it, "like porter." Almost three months previously she had discovered a lump in the stomach, but it was only during the few weeks immediately before coming to hospital that she noticed it increasing very rapidly in size. On examination one saw a thin, emaciated woman, whose face was drawn into innumerable wrinkles and furrows from suffering. The skin was simply hanging on her bones, and, so far as age was concerned, she looked nearer eighty than sixty years. She was almost edentulous, and her general appearance would be best appreciated

by saying she was a cadaverous-looking old woman. On inspection of the abdomen one could easily see projecting through the attenuated walls a tumour situated a little above and to the right of the umbilicus. On palpation the tumour felt hard and irregular, and was obviously quite adherent to the abdominal wall. There was no rigidity of the abdominal wall, and the patient did not complain of any tenderness. On percussion the stomach was thought to be dilated, but there was no splashing. Dr. Craig saw the patient with me, and we both formed the opinion that the case was one of carcinoma gastri possibly supervening upon an old-standing ulcer. This opinion we formed from the age and appearance of the patient, from her thin emaciated condition, from the history of three years' trouble prior to the formation of a tumour, and from the rapidity of the growth of the tumour as well as from its stony, hard, irregular, nodular character. A test breakfast was given next morning, and the contents of the stomach subsequently withdrawn and examined for free hydrochloric acid, but with a negative result. From our previous opinion this was only what was anticipated.

Operation did not seem to hold out much prospect of relief or cure, but, on consultation with Dr. Craig, I decided to place the matter fully before the patient, explaining the gravity of any operation in her then state of health, as well as the very small likelihood that her condition could either be ameliorated or cured, with the result that I was given a free hand to act as we thought best, as, she said, her life was then utterly unbearable from pain and vomiting. Three days later, the patient being meanwhile put through the usual preliminary preparations of feeding and cleansing of the mouth, we operated. The abdomen was opened through the right rectus, and on passing the hand within the tumour was found firmly adherent to the abdominal wall. As there was no discoverable evidence of secondary involvement of the liver or other structures in the neighbourhood save a couple of enlarged glands in the lesser omentum, and as we saw that by exercising the portion of the abdominal wall to which the tumour was adherent the growth could easily be withdrawn, I determined to act accordingly and perform a partial gastrectomy. The anterior portion of the sheath of the rectus muscle over the tumour was then dissected up, leaving apparently quite healthy

muscle underneath. The rest of the abdominal wall to which the tumour was adherent was then excised by an elliptical incision, and the stomach with the tumour and portion of the belly wall withdrawn. The growth presented all the naked eye appearances of cancer, which seemed to have been pyloric in origin, well limited towards the duodenum, but spreading along both curvatures of the stomach. The greater and lesser omenta corresponding to the amount of stomach I decided to remove were ligatured, and cut off. The coronary artery was double ligatured and two large clamps applied across the stomach, so that section of the stomach could be made between them at a point which would leave at least two inches of apparently healthy stomach between the growth and the point of section. The stomach was divided by the knife, and the pyloric portion with the tumour being well wrapped up in sterilised sponges, was pulled well over to the right and left hanging over the right side of the abdominal wall. The cut edges of the cardiac side were then rapidly sewn together with a medium-sized silk suture, applied continuously, the sutures passing through the entire thickness of the stomach walls and pulled sufficiently tight to be hæmostatic as well as coaptive. The clamp was removed, and there being no sign of bleeding a second continuous suture of fine silk, taking up only the serous and muscular coats, was then applied so as to enfold the first row. The duodenum, being freed by incising the peritoneum to the right of its second portion, was clamped and section made between three-quarters of an inch and one inch below the growth. It being then determined that the cut edges of the duodenum could be easily approximated without tension to the back of the stomach beyond the sutured edges, this procedure was carried out, as described by Kocher, by a double row of continuous sutures of fine silk. What was taken to be the œsophagus during this procedure was then found to be a constriction of the body of the stomach, due to the cicatricial contraction of an old standing ulcer producing an hour-glass condition of the stomach. It was obvious that, to close the abdomen and leave such a constriction about two and a half inches to the left of the gastro-duodenal junction we had effected, would necessitate, in case of recovery, a further operation at a date not very distant. The patient's condition being very good,

and as only some forty minutes had elapsed from the time the operation started, I decided to perform gastroplasty for the hour-glass constriction, which was accordingly done in the usual way. The lines of suture were then sponged with warm saline solution, the packing removed, and the edges of the abdominal wall adjusted, the defect in the rectus being remedied by transverse suturing of the posterior portion of the sheath and overlapping of the anterior part of the sheath. Repair was rendered easy by the relaxed state of the abdominal walls. The resulting cicatrix was everything that could be desired. The completed operation occupied exactly seventy minutes, and the shock was not at all severe. The subsequent course of the case I will not weary you with, suffice it to say that there never was any symptom until the present moment which caused us the slightest apprehension. Her progress to recovery was uninterrupted and rapid. The method of feeding was that adopted after any ordinary gastro-enterostomy. On the fourth night after operation she asked for some albumen water, but the moment the nurse proceeded to get it the patient got out of bed, and, in spite of all the nurse could do or say, walked round the ward. On speaking to her next day about the risk she ran in acting in this fashion she told me she merely acted as she did in order to see how she could get along after going through so much. The only effect of the midnight perigrination seemed to be that of producing a sound sleep of almost seven hours. Fish was given on the tenth day, and she was allowed up on the fourteenth day, and left hospital for the convalescent home, Bray, on the twenty-third day, able to eat meat without pain, discomfort or sickness.

Since then she has remained in perfect health, and as she expressed it to me last week "she has no pain, never vomits, can make use of anything she gets, and, in fact, feels grand."

On making a section through the tumour and portion of stomach and duodenum removed the centre of the growth was found to be occupied by a circular ulcer with sharply cut edges, the surrounding tissue being dense and hard. A small piece was cut out of the edge of the ulcer and adjacent tissue and examined by Dr. Boxwell, who informs me he believes the tumour to be merely a mass of indurated inflammatory tissue around an old-standing ulcer.

The points on which I would be glad to elicit discussion are the question of the differential diagnosis of inflammatory growths around old-standing ulcers from carcinoma gastri and the treatment of undoubted carcinoma gastri.

In connection with the first of these points much has been written, but, so far as I know, a reliable diagnosis cannot be made even with the abdomen opened. Mr. Moynihan, at the discussion in connection with the suggical treatment of chronic gastric ulcer at the Annual Meeting of the British Medical Association, August, 1905, stated that he believed he could then reliably distinguish the inflammatory tumefaction from the carcinomatous condition after opening the abdomen, but I think the points upon which he laid most stress are not by any means infallible. Numbers of cases have been considered absolutely hopeless by even the most experienced surgeons, any attempt at removal of the tumour being looked upon as utterly impossible. The palliative operation of gastro-enterostomy was performed, as it was said, to render the last few weeks, or possibly months, of life more endurable, but the subsequent results upset all calculations previously formed about the nature of the growth, as the patients got perfectly well. In several such cases the abdomens were opened subsequently for other conditions, and on examining the stomach all evidence of tumour formation had disappeared, the only sign of any pre-existing pathological lesion being a cicatrix or puckered condition of the stomach wall or pylorus.

With regard to the second point—viz., the treatment of cases of undoubted carcinoma gastri—much difference of opinion still exists. In endeavouring to arrive at an opinion on this point one should compare the average length of life of patients suffering from carcinoma who remain un-operated upon, the average duration of life of

such cases after the performance of the so-called palliative operation of gastro-enterostomy, and the average duration of life of patients after the performance of partial or even complete gastrectomy. The mortality of the two operative procedures mentioned should also be contrasted.

Von Mikulicz has published the results of his experience, so far as this inquiry is concerned, from the observation of no less than 458 cases. (I take this very largely from his article in "von Bergmann's Surgery," Vol. 4.)

The average duration of life of the unoperated cases was a little over eleven months. The average duration of life of cases upon which simple exploratory laparotomy alone was performed was nearly fifteen months. If these groups are added together we get the average duration of life as about thirteen months from the onset of the disease, and this is the figure Mikulicz takes as his basis for determining the results of the operative treatment of gastric cancer.

The average duration of life after the performance of gastro-enterostomy was, in 145 cases, a little over twelve months—that is, a little less than the average duration of life of the unoperated cases, calculating from his basis as taken above.

The average duration of life after gastrectomy (partial or complete) was perfomed was twenty-four and a half months. When these statistics were published, of 20 cases of gastrectomy then living, four were alive and without any sign of recurrence for over three and a half years, while no less than ten cases were alive over two years.

As regards the mortality of these two procedures, the comparison is also interesting.

The mortality of the operation of gastro-enterostomy stood at no less a figure than 26.5 per cent., whereas the mortality of gastrectomy, which up to 1898 had stood at 46.5 per cent., has since that date fallen to 25 per cent.

Clairmont, in a paper based on 258 operations on the stomach, from Professor Eiselberg's Clinic, says, out of a series of 77 cases of malignant disease of the stomach excision of the growth was performed in 24, with a mortality of only three—equal to 12.5 per cent.—a truly phenomenal result. The average duration of life after gastro-enterostomy in this series of cases was 200 days, as contrasted with 400 days after partial gastrectomy.

All surgeons at the present time will readily concur that where it is possible to perform gastrectomy, partial or complete, for gastric carcinoma this is unquestionably the proper procedure to adopt, but no very good purpose can be served by endeavouring to draw a comparison between the average length of life after the performance of gastrectomy and gastro-enterostomy respectively, for the operations are performed in totally different conditions. The cases in which the palliative operation of gastro-enterostomy was performed were cases too far advanced for gastrectomy. A true comparison could only be drawn if a large number of cases have been taken, in all of which gastrectomy could have been easily performed, but in half of which gastro-enterostomy was done while gastrectomy was performed in the remainder. Then the average longevity of one might more fairly have been contrasted with that of the other. But one could scarcely conceive a surgeon deliberately performing what at best could only be a palliative operation while it was possible to perform a radical operation, and by this means give the patient even a slender chance of complete cure. There is, therefore, no good to be gained by following the hypothesis further. The operations are performed in patients who have reached totally different stages in the progress of the disease, and the results should not be contrasted.

After the performance of gastrectomy a few cases may

be said to have been permanently cured, while life in others was prolonged from one to four years with a condition of tolerably good health.

A comparison of these results with the absolute futility of medication, high frequency currents, and other non-operative methods for treatment, renders the great benefit of operation more apparent.

Mikulicz says—"The results of gastrectomy compare very favourably, as regards duration of life after operation, with the results of operations for cancer of the tongue and rectum, and are not very much worse than those of operations upon cancer elsewhere in the body, the surgical treatment of which is recognised as justifiable."

He sums up his conclusions on this subject by stating that "in view of the considerable number of patients who die within a few days after operation, and the still greater number who live only a few weeks, we must conclude that gastro-enterostomy for cancer of the stomach is an operation of little value, and one which is likely to be performed less and less often," and from these facts "one must admit that resection of the stomach, when it is technically advisable, is the best palliative operation for gastric cancer."

Moynihan, in his recent book on "Abdominal Operations," gives prominence to this expression of opinion when he says "the question may arise as to whether gastrectomy should not be performed deliberately as a palliative operation in cases where an early secondary deposit can be seen in the liver, or inaccessible or irremovable glands are found in the pancreas, or along the aorta or vena cava, if we take into account the following advantages of gastrectomy as compared with gastro-enterostomy—That a prolongation of life for ten months longer than the period given by gastro-enterostomy is the rule; that the comfort, general health, appetite, and well-being of the patient are

all emphatically better; and finally, that the patient has always a chance, even though it is of the slenderest, of a complete recovery from this disease."

The first of these alleged advantages I have already dealt with above; with the second I fully concur, but I must say I fail to see what "slender chance of complete recovery" a patient can have after gastrectomy for cancer if "inaccesible or irremovable glands are found in the pancreas, or along the aorta or vena cava, or if a secondary deposit is seen in the liver." My own opinon is that one is not justified in performing gastrectomy for cancer if secondary deposits are seen in the liver, or if glandular involvement exists to such an extent as to be impossible of removal. Though the operation of gastrectomy may be technically possible, it is not under such circumstances, I think, "technically advisable."

The comparatively small number of cures that are effected must be attributed to our inability to make a diagnosis sufficiently early. In how few cases do we see a diagnosis of carcinoma gastri made before a tumour can be palpated, and it has been stated that when a cancerous condition of the stomach has progressed so far as to give rise to a palpable tumour the case has by that time passed beyond the sphere of radical operation with any prospect of cure. That this statement is very largely true is obvious from the fact that one frequently sees cases in which a tumour can be palpated only with the greatest difficulty. It seems small, and quite freely movable, yet, when the abdomen is opened a few days later with the idea of performing a radical operation, the area of infiltration is found to be so extensive along the lower curvature that even a complete gastrectomy cannot be performed. There seems to be little or no definite ratio between the size of the

tumour palpable through the abdominal walls and the extent of the disease one finds within.

Occasionally one finds a comparatively large tumour on palpation, and on opening the abdomen there is but little infiltration of the stomach wall—at any rate so far as the fingers and naked eye can detect.

Mr. Moynihan's advice on the question of diagnosis is an eminently practical one—"To better our results we must explore, not to confirm, but to make, a diagnosis."

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Mr. Maunsell stated that the symptoms upon which he laid stress in the diagnosis of gastric cancer were absence of free hydrochloric acid, short duration of gastric symptoms and, in many cases, irregular pyrexia. In one case he had performed almost complete gastrectomy, but with fatal result. Quite recently he had operated on another case, and took away about half of the stomach, and the patient was making good progress. He thought that, short of cancer in the liver, every effort should be made to remove cancer of the stomach.

Mr. Jameson Johnston considered that the growth should be removed if possible, as much more benefit was likely to ensue than after gastro-jejunostomy.

# APPENDICITIS.

By DENIS KENNEDY, F.R.C.S.I.
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[Read in the Section of Surgery, February 23, 1906.]

It is quite usual to read in surgical text-books and in medical journals elaborate accounts of the indications for operation in appendicitis. The condition of the pulse, the temperature, and the tongue, the position of the legs, and numerous other signs and symptoms are all enumerated to show when we should operate; and, usually as a final touch to the picture, the writer gives us a couple of special signs which, when present, always make him recommend operative procedure. And all this forgetful of the fact that no two cases run on parallel lines. In consequence, we cannot wonder that the ordinary practitioner is confused as to the course he should adopt in these cases, and that there is a fixed idea in his mind that operation in appendicitis should be carried out only when the patient is on the brink of the precipice, that it is exceptionally dangerous, and that every effort should be made to bring the patient to convalescence without it. This certainly seems to be the practice in Dublin and throughout Ireland generally. I am of opinion that the subject ought to be viewed from quite a different standpoint, and that once the disease is diagnosticated, this in itself ought to be quite sufficient to have operation carried out. I refer, of course, to true acute appendicitis, and only to the acute condition, throughout my communication. I do not say that every case of appendicitis must be operated on to save the

patient's life, but I do say that the results of early operative treatment are much better than those at present obtained by what is called expectant treatment. This is the opinion held by the large majority of the best surgeons in America and by many Continental surgeons of the highest repute.

Instead, therefore, of giving a long list of symptoms that call for operation I would give two or three conditions that are opposed to it—First, when a patient cannot be operated on under favourable circumstances, and by some one who knows how; second, when the patient is practically moribund; and third, when some visceral lesion is present, such as bad heart disease, which would contraindicate any operation whatever.

I can imagine some ten or fifteen years ago men laying down the law when operation should be carried out for intestinal obstruction or for strangulated hernia. I am old enough to have been taught that in the latter condition taxis was first to be tried, then a hot bath until the patient nearly fainted, then taxis again, then an anæsthetic, and finally taxis while the patient was under the influence of the anæsthetic. If the hernia were not then reduced, and the patient happened to be alive, the question of operation should be discussed. No wonder the mortality was high, either with or without operation. Pretty much the same idea at present prevails with regard to the treatment of appendicitis. When the circumscribed inflammation becomes diffuse, when the localised abscess bursts into the general peritoneal cavity, when the appendix is sloughing, in short, when the patient is in the worse possible condition for operation, and when the difficulties to the operator are almost insurmountable, then, and not till then, are we to attempt to get rid of the offending organ. Consequently, the duration of this most

painful illness is anything from three weeks to as many months, and the mortality is said to be from 20 to 25 per cent. With early operation the duration of the illness will be exactly eight days and the mortality nil. Besides, we do not expose our patient to an unnecessary procedure, as we are, I think, all agreed that once a person gets an attack of appendicitis, if not operated on during the attack, and should he survive, he must be operated on afterwards to prevent a recurrence.

There is a widespread notion in the profession, even among operating surgeons, that opening the abdomen during an attack of appendicitis is particularly dangerous. This I believe to be a complete fallacy. During the last two years I have operated on forty-three cases of acute appendicitis. The illness previous to operation varied from eight hours to about three weeks; the pathological conditions found were anything from simple appendicitis to gangrene of the appendix with diffuse peritonitis; the ages of the patients ranged from three to seventy-one years, and I have not had a single death.

If operation is carried out before complications have arisen appendicectomy during an attack is just as safe as during the quiescent period; and when complications have arisen, such as peri-appendicular suppuration, operation is no longer a matter of choice, but of necessity.

Most of us are usually able to diagnosticate appendicitis when it occurs. None of us can tell what pathological conditions may be present or ensue during an attack. Diffuse peritonitis, formation of secondary abscess, sloughing of the appendix, intestinal obstruction, any or all may ensue from what was originally a mild attack, and we may have very little proof of their occurrence till it is too late for our patient.

To show the futility of expecting some cases to get well

without operation, and to illustrate the dangers to our patient there may be in delay, with your permission I will give a brief history of some of the cases I have operated on.

Case I.—Master E. F., I saw on Monday, the 17th of December, 1905. He was ill from the previous Friday, had persistent vomiting and continuous pain diffuse over the abdomen, but worse over the right iliac fossa. No motion of the bowels had occurred for three days, in spite of large quantities of purgatives that had been administered, and only one ounce of urine had been secreted during the previous twenty-four hours. His abdomen generally was distended, and the muscles over the right half were very rigid. Temperature was 101°, and his pulse-rate 115. I diagnosticated appendicitis with ensuing ileus, and recommended immediate operation. Both the diagnosis and the treatment recommended were agreed to by my colleague Dr. Savage, whom I asked to see the patient in consultation. The boy was sent to a private nursing home, and I operated that evening, Mr. Tobin kindly assisting me. I found the inflamed appendix twisted like the letter U behind the cæcum, and so firmly fixed by adhesions that the lower end of the cæcum was bent backwards and upwards almost at right angles. The ileum was distended. On removing the appendix the cæcum resumed its normal position, and flatus at once began to gurgle through. There was some pus and a good deal of serous and plastic peritonitis in the neighbourhood, especially over the small intestine. I wiped away the pus, provided for drainage, and the boy made a rapid and complete recovery.

Case II.—Frances B., aged five years, I was called to see on the 2nd of August, 1905. She was suffering from a typical attack of appendicitis. Two days subsequently Dr. Savage saw the case with me in consultation. The question of operation was discussed, but the child's mother strongly objected. As the disease seemed to be running a normal course, and as there were no urgent symptoms, we consented to wait and adopt the treatment of masterly inactivity. Nothing of consequence happened until the night of the 5th of August, when the child suddenly collapsed, her temperature falling from 102° to 96°.

When I saw her in the early hours of Sunday morning her condition was one of profound collapse, with its associated symptoms. There was no longer any question of postponing operation if the child was to get the least chance of recovery. Dr. Savage again saw the case in consultation, and agreed as to its urgency. On account of the patient's condition she could not be removed to a private hospital, and, consequently, I had preparations made as quickly as possible for operation in her own home. On opening the abdomen by an incision over M'Burney's point I had the greatest difficulty in finding the appendix. I prolonged the incision upwards in front of the kidney, as a mass was to be felt in that region. I found a gangrenous appendix lying in a quantity of fæcal pus along the posterior wall of the cæcum. On removing the *debris*, which contained some fæcal pellets, the outer coat of the posterior wall of the cæcum ruptured spontaneously to the extent of about an inch. I attempted to suture both the appendiceal opening and the rent, but no suture would hold. I greatly feared sloughing of the cæcum would ensue. I contented myself with wiping away the pus and *debris* as well as possible and packing the parts with gauze. I made a counter-opening in the loin, and provided for drainage both through the loin and anteriorly. Nutrient enemata kept the child alive during the next twenty-four hours; then she began to take nourishment by the mouth. No motion of the bowels was allowed for the first five days on account of the bad condition of the cæcum. The child made a perfect recovery, and has not even a ventral hernia as a sequel.

I am much indebted to the assistance of Dr. Savage in bringing this case to a successful issue both during and subsequent to the operation.

Case III.—Miss M., aged twenty-eight years, I sent to Jervis Street Hospital in June, 1904. She suffered from a well-marked attack of appendicitis, and had been ill for twenty-four hours. I kept her under observation for a couple of days, carrying out the usual expectant treatment. She did not improve, and on the evening of the third day of her stay in hospital her temperature reached 105° after a pronounced rigor. I operated on the following morning after a consultation with my colleague

Dr. Thompson. The appendix was greatly inflamed and distended, and there was well-marked evidence of general serous peritonitis throughout the whole abdomen, without a trace of any adhesion whatever. In a few hours more I have no doubt the abdomen would have been filled with pus. I removed the appendix, flushed out the abdomen with normal saline solution, and provided for free drainage. The patient made a complete recovery. Through my delay in operating, which was due to the prevalent practice, I nearly sacrificed my patient's life.

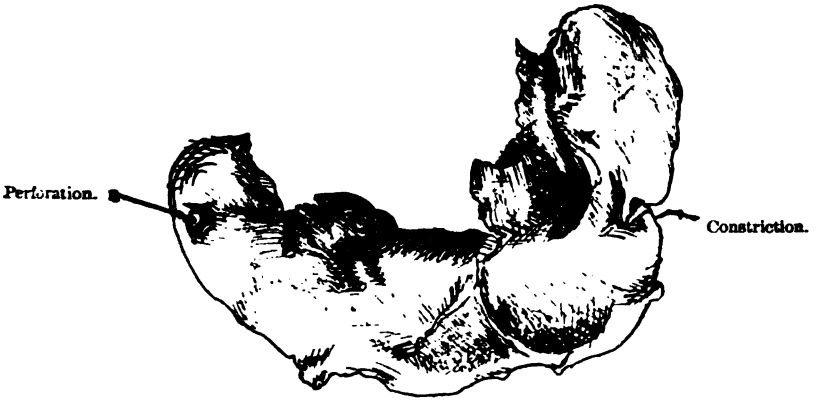
Case IV.—Mrs. B., aged seventy-one years, was sent to me to Jervis Street Hospital by my colleague Dr. Savage. Six years previously she had an attack of appendicitis, from which she recovered, but a large swelling remained in the right iliac fossa. It did not cause her any trouble, and, in consequence, she refused operation. On a Tuesday morning, as she was getting out of bed, she felt something give way in her abdomen; pain and vomiting quickly ensued. She developed intestinal obstruction with peritonitis, and although urged to operation by Dr. Savage she refused until the following Saturday, five days after her attack began. When I saw her in hospital she was in a semi-comatose condition, and had all the appearance of approaching death. I operated at once, making a long incision over the appendiceal region. The abdomen was filled with pus; there was no attempt at any limiting adhesion. I quickly removed the appendix and provided for free drainage. I neither douched nor in any way attended to the toilet of the peritoneum, for the simple reason that any delay would have caused the patient's death on the operating table. For forty-eight hours the dressings were constantly saturated with pus. Her bowels acted the day after operation, and she made a slow but good recovery, with no sequela, but a fistula from the peritoneal cavity. She left hospital eight weeks after the operation.

Case V.—A young girl, aged twenty-two years, was admitted to Jervis Street Hospital, April, 1905. Twenty-four hours previously she attended the out-patient department complaining of some abdominal pain; she refused to be examined, and, consequently, was not prescribed for. She returned to her home; pain continued during the day and night, associated with vomiting.

The following morning she collapsed, and was brought to hospital in the city ambulance. I saw her in consultation with my colleague Mr. Byrne. We diagnosticated perforating appendicitis, and carried out immediate operation. The whole region around the appendix and the pelvis was filled with pus, without any limiting adhesions. The appendix was intensely inflamed, and perforation had occurred through the cæcum, half an inch from the base of the appendix. I sutured the perforation, removed the appendix, wiped out the pus and *debris* with gauze sponges wet with hot saline solution, and provided for free drainage. No douching was employed. She made a good recovery.

CASE VI.—Mr. S., aged fifty-six years, I saw in consultation with Drs. Savage and O'Carroll in August, 1905. Patient was six days suffering from appendicitis, and a large swelling was present in the right half of the lower part of the abdomen. He had been a liberal drinker, suffered from fatty degeneration of the heart, with congestion of the lungs, liver and kidneys. Albumen was present in the urine in quantity. We were unanimous as to the gravity of the case, but the difficulty was to find a solution. The condition of his abdomen demanded operation, his general condition was totally opposed to it. On the advice of Dr. O'Carroll we decided to wait for twenty-four hours in the hope of improvement supervening. That night the patient had rigors, and next day his condition was decidedly worse. Consequently, I carried out operation, being assisted by Mr. Tobin and by Mr. Keegan, who gave the anæsthetic. I opened the abdomen by incision over the appendiceal region, and evacuated a large abscess from between the coils of small intestine and behind the cæcum. The suppuration was limited by marked adhesions. I could have removed the appendix only with great difficulty and a prolonged operation. I contented myself, therefore, with wiping out the pus and providing for free drainage. The patient made a good but protracted recovery under the care of his physician, Dr. Savage, in spite of the fact that three weeks after his operation he got an attack of profuse hæmoptysis, which was probably due to hæmorrhagic infarction of his lung. He can be seen again at all the Irish race meetings prosecuting his calling as a bookmaker with great vigour.

Case VII.—Mr. M., aged thirty years. I was brought to Camden Street about 3 30 a.m. on the morning of the 23rd of November, 1905, to see this patient, who had gone to bed quite well on the previous night, but woke about midnight with violent pain in his abdomen, which was followed by vomiting. When I saw him he was collapsed, his legs were drawn up; there were great tenderness and rigidity of the muscles over the right side of the abdomen, especially over the iliac region. His temperature was 102°, pulse-rate 115. I diagnosticated fulminating appendicitis, and sent him at once to Jervis Street Hospital in the ambulance. I operated a few hours subsequently. On opening the abdomen




Appendix, with constriction towards the cæcal end and a small perforation near the tip, removed from Case VII.

pus was everywhere present without a trace of any limiting adhesion. I found the appendix enormously distended, with a perforation about half an inch from its tip. Through this perforation pus was flowing freely into the abdominal and pelvic cavities. I removed the appendix, wiped out the pus, which was present in quantity, and provided for free drainage. I used no douche. The patient made a rapid and complete recovery. His case is especially interesting from the fact that six months previously he had an attack of enteric fever, which so resembled appendicitis that a positive diagnosis could only be made with the Widal reaction. He also suffered from well-marked mitral regurgitation.

With regard to the diagnosis of the disease, it does not as a rule present any great difficulty, especially in adults. Murphy, of Chicago, lays special stress on the order of the occurrence of the symptoms. He says—"There is first abdominal pain, sudden and severe, followed by nausea and vomiting, general abdominal sensitiveness, elevation of temperature, beginning from two to twenty-four hours after the onset of the pain. These symptoms occur, almost without exception, in the above order, and when that order varies I always question the diagnosis." He also says "that temperature in acute appendicitis must always be present, and that it never precedes pain." I think this summing up of the symptoms is as near as we can get to a good guide to the early diagnosis or the normal illness in adults. Two symptoms that are often relied on for a diagnosis are very fallacious. First, the right leg I have never seen drawn up, even when an abscess was present. Both legs may be drawn up when diffuse peritonitis exists. Second, the most tender spot is not always M'Burney's point, but varies according to the position of the tip of the appendix.

The rectum, and in females the vagina, should always be examined to determine whether pelvic suppuration is present or not, and no examination of a child is satisfactory without an anæsthetic. In children the diagnosis sometimes presents great difficulty, as is illustrated by the following case:—

Case VIII.—Baby K., aged three years, suffered for five days from violent spasms of abdominal pain; there was no vomiting, no elevation of temperature, and only slight constipation. During the intervals of the attacks of pain the child seemed well. On careful examination I found a thickening over the region of the appendix, and there was considerable tenderness present. The spasms of pain passed off gradually, the child's general condition improved, but the swelling and tenderness in the right iliac fossa seemed to get more pronounced.

Consequently I recommended operation, which I carried out in the Private Hospital, 20 Mountjoy Square, assisted by Dr. Savage and Mr. Keegan. On incising over the appendiceal region I found a large mass adhering to the anterior abdominal wall. To get into the abdomen I prolonged my incision upwards, and was then able to separate the mass from the anterior parietes. I found the mass to consist of a very long, thick appendix, with the distal half enveloped by the lower part of the omentum. I amputated the appendix, excised the part of

Appendix, enveloped by omentum, removed from child, Baby K., aged three years.

omentum involved, and removed the whole mass together. Professor McWeeney examined the specimen, and reported that it showed undoubted signs of having been the seat of repeated attacks of inflammation; while the part of the appendix and omentum matted together were on the point of breaking down into an abscess. The child made a rapid and complete recovery.

The incision I make for appendicectomy in acute cases is the one that crosses M'Burney's point. I avoid the

muscle-splitting operation, as I believe its advantages are outweighed by its disadvantages. If the appendix is in an abnormal position it is difficult or impossible to find it with such an incision, and if the incision has to be enlarged the operation presents many difficulties. Our aim in operating ought to be twofold—first, remove the offending organ if possible; secondly, where peri-appendicular suppuration exists, free drainage should be provided for. In some cases it is not possible to remove the appendix, however desirable it may be, without endangering the patient's life, especially when abscess exists. The manipulations necessary to free the appendix may cause serious injury to an inflamed bowel in the neighbourhood, or may carry infection to a wider area than was previously involved; or the condition of the patient may be such as to forbid a prolonged operation. Fortunately, its removal is not always necessary to save the patient's life; but convalescence will be more prolonged, suppuration will be more persistent, and, consequently, there will be much more risk of a ventral hernia ensuing. Besides, a focus of infection is left in the abdomen which may give rise to trouble again in either the near or remote future. What, however, is absolutely essential is, that where pus is present, whether localised to the neighbourhood of the appendix or not, free drainage must be provided for. I think on this largely depends the success of the operation as a life-saving means. I employ for drainage a slit rubber tube with a gauze wick. I change the gauze as soon as it becomes saturated, as I believe once that occurs it acts as a plug, not as a drain.

We must remember that pus may be present in quantity from appendicitis either in the pelvis or in the retro-cæcal region, and no sign of it appear when we open the abdomen. Consequently, if we have to search for a sus-

pected abscess these are the two most likely regions in which we will find it. Further, if pus exists free around the appendix it will most likely have made its way to the pelvis. The question of drainage through the vagina or rectum must then be considered. I have met with retro-cæcal appendicitis and suppuration in four cases. The condition may be suspected if, in connection with appendicitis, there are a fulness and tenderness in front of the renal region. In one of my cases in a child, already mentioned, the appendix was completely gangrenous, and lay well up in front of the kidney.

The points to be remembered in operating in these cases are, first, we must prolong our incision upwards, and, secondly, to reach the trouble we must draw the cæcum and ascending colon towards the middle line. We can thus remove the appendix, get rid of the pus, and establish free drainage through the loin or anteriorly without the least danger of the general peritoneal cavity becoming infected.

I am no believer in the extensive procedures that are sometimes carried out in cases where suppuration exists in connection with appendicitis. These consist in removing the appendix at any cost, in free manipulation of the intestine, in excising every portion of the omentum that comes near the pus, in breaking down adhesions freely, and in douching, swabbing, and paying elaborate attention to the toilet of the peritoneum. I am thoroughly convinced that whether suppuration is localised or diffuse, the peritoneum is well able to look after itself, if it gets a fair chance, by free exit being given to the pent-up inflammatory exudation, and that, when diffuse suppurative peritonitis exists, the quicker the operation is finished and the less manipulation there is of the intestine the better chance there is for the patient.

Douching, if used at all, should be employed only when the fluid used can escape by a counter-opening as freely as it enters the abdomen and when a large part of the abdominal cavity is infected. Under these conditions it is certainly harmless unless for the time it takes, but its benefit is a very doubtful quantity. Rough sponging injures the delicate endothelial lining of the peritoneum, and thereby tends to destroy its inherent power of resisting infection. I content myself with gently wiping away any pus that I find with a gauze sponge wet with normal saline solution. I have practically given up the use of the douche altogether in these cases. Manipulation of the intestine to any extent I look upon as being decidedly dangerous.

In conclusion I may say—

(1) The dangers of operating in an acute attack of appendicitis have been greatly exaggerated, and with proper care are most imaginary.

(2) When suppuration is diagnosticated, operation should not be delayed in the hope of adhesions being formed and the pus becoming circumscribed.

(3) Children who get the disease usually have to be operated on for recovery.

(4) Our motto in treating the disease should be—"Leave nothing to chance." Consequently, have the appendix removed as early as possible.

I owe an apology to the members of this Section for bringing such a well-discussed subject before them and for my inability to treat it in a communication such as this in anything like an exhaustive manner.

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MR. GUNN referred to the importance of a leucocyte count in coming to a diagnosis, and recommended the employment of palliative measures before urging operation.

Mr. A. B. Mitchell (Belfast) alluded to the difficulty sometimes experienced in diagnosing appendicitis in an early stage. He had seen the condition confounded with perforation of a duodenal ulcer. He thought it advisable to remove the appendix in suppurative cases, and also at a very early period if the disease were diagnosed with certainty. Failure to remove the appendix might lead to recurrence with abscess formation.

Dr. Savage mentioned some facts illustrating the connection between appendicitis and suppuration elsewhere in the body. In one case he thought an attack of appendicitis had followed upon follicular tonsillitis ending in suppuration.

# EXCISION OF THE ENTIRE SCAPULA.

By A. B. MITCHELL, M.B., F.R.C.S.I.;
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[Read in the Section of Surgery, February 23, 1906.]

EXCISION of the entire scapula is a comparatively rare operation. It would appear to have been first suggested by Liston in 1819, but the proposal met with much hostile criticism—the general opinion expressed by surgeons of his day being, that it would involve great risk of life, whereas, even if successful, the best that could be hoped for would be a flail-like, useless arm. It was not till 1855, thirty-six years after Liston's original proposal, that Langenbeck successfully performed the first complete operation. His patient was a boy of twelve years, who, however, died three and a half months later of recurrence of the sarcomatous growth, on account of which operation had been undertaken.

The practicability of the operation had, however, been demonstrated during the intervening years, and many details of the operative technique had been gradually elaborated.[1] Thus in 1824 Jansen, of Lyons, removed the entire body of the scapula; in 1830 Skey, of London, removed all but the glenoid process; in 1849 Lentin removed all but part of the acromion; in 1850 Langenbeck removed all but the coracoid, and in 1853 Brüns all but the acromion and coracoid. The only record of a complete excision carried out in Ireland which I have been able to find is by F. Alcock-Nixon, who successfully removed the entire bone for sarcoma in Mercer's Hospital, Dublin, the case being reported in the *British Medical Journal*, 1881, Vol. II., p. 1056.

In 1874, and again in 1875, the scapula was removed in Mercer's Hospital for necrosis, and the entire bone is said to have been excised with excellent functional results in both cases. In July, 1895, Dr. Darling, of Lurgan, removed all but the acromion, coracoid and glenoid processes. The patient was shown at the meeting of the North of Ireland Branch of the British Medical Association in October, 1895, the result being a very useful arm. The movements and contour of the shoulder joint were almost perfect. The tumour for which operation was undertaken proved to be a chondroma. This patient, Dr. Darling informs me, is still living, and in excellent health ten years after operation. The chief dangers associated with the operation are:—

(1) Sepsis.

(2) Hæmorrhage.

Modern surgical technique has so greatly diminished both these risks that Schultz, taking only cases recorded since 1875, estimates the mortality at 7 per cent., and it is interesting to note that the mortality of the complete operation is distinctly less than that of partial operation.[2]

Excision of the scapula is, therefore, a thoroughly justifiable operation from the point of view of actual risk. It remains to be considered whether it is also justifiable from the standpoint of the utility of the limb which is left. When we reflect that this procedure involves complete separation of the attachments of the levator anguli scapulæ, rhomboids, serratus magnus, teres major and minor, supra- and infra- spinatus, pectoralis minor, coraco-brachialis, both heads of the biceps, long head of triceps and, finally, a portion of the deltoid and trapezius– there would certainly appear to be ample justification for the fears expressed by Liston's contemporaries. It is, however, truly remarkable what a useful limb actually remains

after such extensive mutilation, and it is chiefly in illustration of this fact that I bring forward my case as a contribution to the literature of the subject.

Mr. W., aged forty-five, who had always enjoyed good health, and had no family history bearing on the present affection, came to me on 14th July, 1905. He stated that about five years previously he had first noticed a slight pain over the right triceps muscle. He paid little attention to this, and it almost disappeared. In 1902, three years before I saw him, whilst throwing a stone, he suddenly felt "a sort of catch" in his right shoulder. Since then his arm had been weak; his shoulder had got gradually stiffer, and its range of movement more circumscribed. He suffered from a sensation of tingling down the forearm, and pains, sometimes severe, radiated into his hand. He had next a fairly constant aching pain about the shoulder, and latterly this pain had been much worse at night, and frequently wakened him out of sleep. When I saw him he required to support the right forearm; he could not raise the arm to a right angle with the trunk, and there was slight wasting of the muscles, apparently from disuse. Examination of the shoulder revealed a swelling, about the size of an egg, between the spine of the scapula behind and the clavicle in front. This swelling was slightly lobulated, firm and circumscribed, but not uniform in consistence, one spot about the size of a shilling being distinctly elastic. The tumour moved with the scapula. It did not involve the skin. I regarded it as a slowly-growing sarcoma of the scapula. A radiogram seemed to confirm this view. Professor Sinclair saw him with me. Although there was absolutely no specific history, we decided to put him on iodide of potash, and to submit him to a course of X-rays under the care of Dr. Rankin. He derived no benefit from the iodide, but the X-ray treatment promptly relieved the pain and enabled him to sleep comfortably. The rays, however, gave rise to a dermatitis and had to be suspended, when the pain at once returned. As there had been no diminution in the size of the tumour, I advised him to have the scapula excised. He had occasion to go to London on business, and whilst there consulted Mr. Bland-Sutton, who also urged immediate operation.

We delayed a week in the hope that the X-ray dermatitis would subside, but as improvement was very slow, operation was carried out in presence of the eruption. It is interesting here to note that this eruption did not in any way interfere with the healing of the wound, which united primarily except at the points of drainage. On 25th Sept., 1905, in a nursing home, he was anæsthetised by Dr. Fielden, and I had the benefit of Professor Sinclair's assistance and advice.

Lines of attack on the scapula vary according to the surgeon. The favourite incisions appear to be (*a*) a transverse incision following the line of the spine of the scapula and extending from just outside the tip of the acromion to the vertebral border, supplemented by a vertical incision from the centre of the spine to below the inferior angle. (*b*) Picqué[3] employs the same horizontal incision with a second along the axillary border of the scapula, curving at the upper end around the acromion process as far as may be necessary to secure satisfactory exposure of the supra-scapular regions and vessels. (*c*) Watson Cheyne commences with an incision along the anterior border of the axilli, secures and ligatures the sub-scapular artery, which is the commonest source of dangerous hæmorrhage, separates the short head of the biceps, coraco-brachialis and pectoralis minor and the coracoid process, then turns the patient round and completes the operation from behind.

The advantages of this method appear to me to be outweighed by the practical impossibility of keeping both the anterior and posterior wounds aseptic. In the huge cavity left after the removal of the scapula and its surrounding muscles the danger of sepsis is the greatest of all dangers, and for this reason I decided against a line of attack which has many attractions. Hæmorrhage -if we exclude secondary hæmorrhage following sepsis -- can be certainly controlled by the careful application of ligatures before

the vessels are divided, and should not, I think, be a serious cause for anxiety.

In this instance I decided to make my second incision along the vertebral border of the scapula so as to provide easy access to the posterior scapular artery and enable the attachment of the levator anguli scapulæ to be divided without difficulty. The skin incisions having been made, the deltoid and trapezius were rapidly detached from the acromion and spine of the scapula, and the acromio-clavicular point opened, and when this was done a mass of yellowish gelatinous material was found in the infra-spinatous fossa, extending for about one and a half inches below the spine. Regarding this as sarcomatous we decided to freely remove the neighbouring portion of the trapezius. The latissimus dorsi was next dislocated off the inferior angle of the bone; the posterior scapular artery defined and ligatured at the superior angle, after which the rhomboid, levator anguli scapulæ, and serratus magnus were rapidly detached from the posterior border by aid of scissors. Attention was next directed to the axillary border. The subscapular artery, the most fertile source of hæmorrhage, was secured and ligatured without difficulty—the scapula being rotated so as to bring the long head of the triceps into view; this was next divided. The supra- and infra- spinatus were divided close to the attachment to the humerus, and the shoulder joint opened. At this stage, unfortunately, the circumflex nerve was cut, and I would like to emphasise the danger of wounding this nerve. With forcible rotation and dragging on the partially freed scapula it is apt to be somewhat displaced and to lie further out from the neck of the humerus than would be expected. The cut ends were united by catgut sutures. The capsule of the joint was divided close to its attachment to the humerus, and at the same time the tendons of the long head of the biceps and subscapularis were severed. It only remained to secure the supra-scapular artery and divide the insertion of the coracho-brachialis, biceps, and pectoralis minor, which was effected without difficulty. Oozing, which was slight, having been arrested, the scapular attachment of the serratus magnus was fixed by a few catgut stitches to the fascia over the erector spinæ. The deltoid was carefully sutured to the periosteum,

covering the posterior border of the clavicle so as to support as far as possible the head of the humerus and prevent that tendency to drop away from the clavicle which other operators have described, and which is calculated to interfere materially with the subsequent usefulness of the limb. The radiogram which I exhibit, taken three months after operation, shows that the head of the humerus remains in excellent position close up to the clavicle. Very free drainage having been provided, the wounds were covered with the usual sterilised dressings, the arm bandaged to the side, with the elbow well supported. The operation occupied one hour and forty minutes; shock was fairly severe, but in no sense alarming. The total loss of blood only amounted to a few ounces. Subsequent recovery was very satisfactory. He had slight suppuration along the track of the drainage tubes, otherwise union was primary. He left the hospital in five weeks, at which time he was able to write letters with his right hand. His condition has steadily continued to improve. For almost three months he was unable to dress himself, as he could not get the right arm into the sleeve of his shirt or coat, and was, therefore, unable to go from home overnight. He has now overcome this difficulty, and can put on all his clothes, including a heavy overcoat, without assistance. Examination of the arm and shoulder gives the impression of an unreduced dislocation of the humerus. There is only very slight power of abduction, but, by aid of the pectoralis major and latissimus dorsi, both of which muscles were left intact, the arm can be carried a short distance forwards and backwards around the thorax. Notwithstanding the fact that both heads of the biceps and the long head of the triceps have no longer any bony attachment, he has excellent power of flexion and extension at the elbow. The functions of forearm and hand are perfect in all respects. He has a large amount of correspondence, and he informs me that he can write without difficulty and without the slightest fatigue. Sensation is practically normal over the shoulder and arm. There is no indication of any trophic lesion. The tumour when cut into showed numerous soft hæmorrhagic areas. Professor Symmers reports it to be an enchondroma with areas of hæmorrhage, and in the neighbourhood of the capsule round-celled inflammatory infiltration, but without any evidence

of malignancy. There is, therefore, every reason to expect a permanent cure. The usefulness of the arm is most satisfactory. When we consider that no mechanical appliance can be obtained, which in the very slightest degree compensates for the loss of the fingers and thumb with their wonderful combination of movements, it is evident that complete excision of the scapula is eminently justifiable, whether viewed in regard to the subsequent functional power of the limb or to the mortality of the operation itself, which, under modern technique, should probably not exceed 5 per cent.

This operation receives very scant attention in most of the text-books on surgery and operative surgery, but the literature of the subject is now fairly extensive. The most exhaustive article I have had access to is that by Picqué et Dartigues, in the *Revue de Chirurgie*, Tome XXI., 1900, p. 437-438.

[1] Sydney Delaup. Annals of Surgery. October, 1902. P. 523.

[2] Picqué and Dartigues. Revue de Chirurge. Tome XXI. 1900. P. 437, 438.

[3] Revue de Chirurgie. Tome XXI. 1900. P. 437.

# THE TREATMENT OF ACUTE PERITONITIS.

By EDWARD H. TAYLOR, M.D., F.R.C.S.;
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[Read in the Section of Surgery, March 23, 1906.]

Although the title of my communication is that of the treatment of acute peritonitis I fully realise that it will not be possible, in the short time at my disposal, to deal with it in an exhaustive manner, and if I do no more than touch upon many important details it will be understood that a general survey of the subject only is attempted, and that anything like an exhaustive account is out of the question.

With few unimportant exceptions, to which I need not refer, acute peritonitis is an infective process, capable of being excited by certain organisms which reach the peritoneal cavity, sometimes as a consequence of wounds of various kinds, but more commonly infection supervenes in the course of certain pathological processes involving the abdominal or pelvic organs. The alimentary canal is frequently the source of infection—for example, perforating gastric ulcer, duodenal ulcer, appendicitis, various forms of intestinal ulceration and intestinal obstruction. The liver and pancreas are not uncommonly additional sources of trouble, while within the female pelvis the uterus and its appendages are largely responsible for outbreaks of peritoneal inflammation.

It would be impossible for me on this occasion to deal with the bacteriology of acute peritonitis. Suffice it to

say, many varieties of organism may be found in different cases, and that more than one form of organism is usually present in the peritoneal exudate. In other words, acute peritonitis is the result in many instances of a mixed infection. The following organisms seem to be the chief offenders:—Streptococcus pyogenes, bacillus pyocyaneus, staphylococcus aureus and albus, bacillus coli, pneumococcus, bacillus typhosus, gonococcus.

In considering acute peritonitis from the standpoint of its pathological phenomena, its symptoms, and the results obtained by treatment one should not lose sight of the fact that these are determined essentially by two factors—(1) the capacity for resistance on the part of the individual and (2) the intensity of the virus.

It would be of inestimable value to the surgeon if he could succeed at the start in obtaining a fairly correct gauge of the resisting power of his patient. At present the chief points on which he can places reliance are:—(1) The age and general condition of health of the patient immediately preceding the attack. A young and previously healthy adult, it is reasonable to assume, will succeed in withstanding bacterial influences much more successfully than one advanced in years, the subject of some debilitating disease, or who has been addicted to alcoholic excesses. (2) One or possibly a series of blood counts. Should it be found that a high degree of leucocytosis existed it might reasonably be regarded as a formidable omen. It would be a great advantage could one ascertain at an early stage what was the exact nature of the virus, but apart from an examination of the peritoneal exudate this is not possible. If the particular organism or organisms responsible for the mischief could be recognised at an early period of the inflammation it would be an enormous gain, since in the light of recent knowledge one

might be able to determine the actual resistance of the individual to these organisms by estimating the opsonic index, and, if necessary, to augment it by appropriate means. I allude, of course, to Wright's method of treating infective processes by subcutaneous injection of appropriate vaccines.

Concerning the intensity of the virus, I think it is generally recognised that not only do different organisms possess infective powers of different degrees, but that the same organism may vary enormously in virulence from time to time. Thus, the bacillus coli under normal conditions is not necessarily very potent for evil, but in the event of the intestinal contents being unable to pass freely onwards, as when obstruction supervenes, it may acquire a virulency of a remarkable degree.

For the sake of clearness I will just allude to certain types of peritoneal inflammation.

In a mild case, where one may assume the virus of feeble intensity, and perhaps at the same time the resistance of the patient up to a high standard, the pathological process assumes the form of a circumscribed peritonitis—it may be of very limited extent. The fluid part of the exudate is absorbed, the coagulated fibrin on the inflamed surfaces promotes adhesions—*i.e.*, encapsulation of the infected zone, and the prompt destruction of the virus.

In another case—one let us imagine of extreme severity, such as is met with in the puerperal form of peritonitis—the invading organisms, usually streptococci, are excessively virulent. The resisting powers of the individual are unequal to the task, as is evidenced by absence of reaction on the part of the peritoneum. There is no attempt at the formation of adhesions, and the general peritoneal cavity is infected with alarming rapidity. There is an oozing from the membrane of a watery, blood-stained

fluid, poor in cellular elements, and of feeble coagulating power, which is rapidly absorbed and kills by its toxicity. In such a case death ensues rapidly, and the patient dies with symptoms of septicæmia.

Between the two extremes just pictured we may meet with peritonitis of all shades of intensity. Taking an intermediate type, the exudate bears evidence that the resistance has been vigorous. It is abundant in quantity, and rich in cells, which give it a turbid or opaque appearance. It may indeed resemble ordinary pus. A copious exudate, richly cellular, is a favourable sign in acute peritonitis. It would appear that in the destruction of bacteria the liquid and cellular portions of the exudate work together—the serum first devitalising the bacteria, and the phagocytes doing the rest. Most of the cells in the exudate perish and become pus corpuscles, but I think it is reasonable to assume that their phagocytic bactericidal properties have first been given full scope. In addition to the appearance of a bactericidal exudate there will probably be evidence in this imaginary case of a successful attempt to arrest the progress of the inflammation by means of fibrinous adhesions, so that the spread of infection throughout the entire abdominal cavity is prevented from taking place. In the formation of limiting adhesions I must not fail to make allusion to the important *rôle* played by the great omentum. It possesses a remarkable power of applying itself over and encapsulating inflamed parts almost anywhere within the abdomen—more particularly in the case of the appendix, ovary, Fallopian tube, intestine, gall-bladder, and stomach.

It is probable that in the great majority of cases the peritoneal infection is, for a brief period at all events, free. In many it is quickly encapsuled, but in a certain proportion it continues to spread diffusely, but may eventually be

arrested by definite adhesions. In other cases the infection continues to spread progressively until the entire serous sac is infected. The peritonitis is then said to be of the universal or total variety.

In approaching the proper subject of my paper (question of treatment) the first observation which I venture to make is that for surgical treatment to be attended by success the case should be seen early, immediately after the onset of the attack if possible. My reasons for saying so are that a correct diagnosis of the source of the trouble is facilitated at this period, and there is a better prospect of treatment being attended by success, because it can be carried out more speedily and in a more efficient manner. Indeed, the importance of early and correct diagnosis cannot be over-estimated.

Pain, at first localised and associated with local rigidity—for example, in the epigastrium or right iliac fossa—may afford a correct guide to the primary source of the infection, but later, when pain and tenderness have become general, and rigidity is pronounced over the entire abdomen, the difficulties which beset diagnosis may be very great.

Cases of peritonitis at their onset are often seen first by the physician, and upon him rests the responsibility of deciding whether or not surgical intervention is advisable or necessary. Here I would allude to the danger attending the early administration of morphia before there has been sufficient opportunity for making a diagnosis, and before the surgeon is asked for his opinion. Everyone knows how easily one may be deceived by the effects of morphia in an attack of peritonitis. Pain diminishes, rigidity lessens, and an expression may be elicited from the patient of feeling much better when in reality the abdominal condition is becoming steadily worse. With all this masking

of symptoms, however, it will usually be found that the condition of the pulse shows no sign of improvement, and consequently it deserves to be regarded as a valuable index of the degree of toxæmia present. My advice, therefore, is—withhold morphia unless a diagnosis has been made or unless a decision has been arrived at that operative measures are or are not necessary. If one is satisfied that the attack is of a mild character and that everything points to a successful effort of resistance on the part of nature, by all means let the patient's sufferings be relieved my morphia ($\frac{1}{4}$ grain) hypodermically, or if operation is decided upon it is good practice to give a hypodermic beforehand. But if in doubt, by all means let the morphia be withheld.

In arriving at a conclusion as to whether operation is indicated one will do well not to place undue reliance upon any single symptom, but rather to review the group of symptoms collectively before deciding one way or the other. The following are those upon which I would place most reliance:—

(1) The mode of onset of the attack, coupled with the past history.

(2) The pulse, noting its frequency, its amplitude, its compressibility, and its increase in frequency, if any, since the commencement of the attack.

(3) The degree and extent of abdominal rigidity, also the intensity of cutaneous hyperæsthesia. Absence of local rigidity may prove a valuable guiding sign. I have found it particularly so in some cases in which symptoms of peritonitis were simulated by those of intra-thoracic disease.

(4) The facies of the patient. Is it suggestive of acute distress? Are the movements of the alæ nasi markedly accentuated?

(5) The presence or absence of shock when the patient is first seen.

(6) The length of time which has elapsed since the commencement of the attack. The necessity for operative intervention should be seriously considered if there were no abatement in the acuteness of the symptoms within the first twelve hours. It is difficult, however, to assign a time limit. Each case must be judged upon its merits. It would be better to operate, even on the chance of finding no lethal condition present, than delay intervention until the favourable moment had passed.

(7) The information afforded by a blood-count—*i.e.*, does it reveal a marked degree of leucocytosis?

(8) Have the so-called secondary phenomena supervened? By these I mean a train of symptoms depending upon intestinal paralysis and meteorism. The abdomen undergoes progressive distension. Vomiting and hiccough persist. The pulse increases in frequency, but loses steadily in strength and volume. The extremities are cold and livid. The facies of the hippocratic type.

These symptoms are not entirely due to the distension of the paralysed bowel, but to a large extent also to the added infection brought about by the increased permeability of the intestinal wall, in consequence of which bacteria and their toxins overwhelm the peritoneum and do away with whatever chance it had of overcoming the infection already there.

By reviewing the symptoms collectively in this manner in conjunction with any noteworthy facts in the past history one may succeed in coming to a definite conclusion as to what are the proper indications for treatment.

Although one's own experience and the results recorded by various writers go to show that many cases of severe peritonitis, which there is every reason to regard as diffuse,

recover without operation, or at most with the formation of a localised abscess, yet I think I may safely say that immediate operation would be indicated—

(1) If the symptoms were acute and pointed to a diffuse peritonitis, more especially if doubt were entertained as to the actual source of the inflammation.

(2) If there were reason to suspect gastric or intestinal perforation.

(3) If the symptoms were acute and the inflammation obviously spreading, as evidenced by increase of pain, abdominal rigidity, and pulse-rate.

(4) If within the first few hours succeeding the onset of the attack there were no signs of abatement, but rather the reverse, the pulse-rate increasing meanwhile, and abdominal distension becoming more obvious.

Concerning the details which should be attended to preceding operation I would merely mention that a hypodermic of morphia may be given, the patient should be well protected by clothing, and the surroundings—operating theatre or bedroom—should be warm. If vomiting has been troublesome it would be advisable to wash out the stomach. Everything appertaining to the operation should be carefully planned; all instruments and appliances likely to be required should be in readiness. Each individual taking part in the operation should have his or her duties clearly defined; in fact, it should be the aim of the surgeon in charge to get through with the business in hand as expeditiously as possible.

General anæsthesia is invariably indicated, but at the same time it should not be unduly pressed. It should be just sufficient to enable the surgeon to do his work quickly and efficiently without let or hindrance. I am firmly convinced that one only invites a fatal issue by insisting upon a profound degree of narcosis. Local anæsthesia is

entirely unsuited for a case in which a careful investigation of intraperitoneal structures has to be carried out, or where the parietal peritoneum has to be dragged upon or handled to any extent. Local anæsthesia has, I believe, but a limited application, and finds its principal indications in the formation of a fœcal fistula or the evacuation of an intraperitoneal collection of pus.

The site of abdominal incision will depend upon the diagnosis. Thus, in a case of perforated gastric ulcer it will be in the epigastrium, or if appendicitis be the source of mischief it will be arranged in the right iliac fossa. If one is in doubt as to where the peritonitis has originated the incision had better be made in the middle line below the umbilicus, and if necessary a second incision may be made subsequently at some other level if more direct access be required.

When the abdominal cavity has been opened, one should immediately seek information upon the following points:—

(1) The general character and amount of the exudate, its degree of turbidity, the presence or absence of gastric or intestinal contents, fœtor if any.

(2) The presence or absence of free gas. If present it will almost certainly reveal itself when the peritoneum is divided.

(3) The diffuse or circumscribed character of the inflammatory process.

(4) The condition of the intestine—viz., its colour—normal injected, livid, &c, its degree of lustre, its freedom from œdema and other marked signs of inflammation, its degree of distension.

(5) In the event of its not having been already ascertained the source of the peritoneal infection should be identified, as it may require to be completely removed or to be

rendered incapable of further mischief. The structures which should, above all others, be examined are the appendix, the stomach, the intestines, and the Fallopian tubes.

The question which naturally presents itself at this stage of the operation is what is the best method of dealing with the peritoneal exudate, but let me just for a moment direct attention to the exact significance of this pathological product. It is a serous fluid containing floating particles of fibrin, and cells in varying amount, mostly leucocytes in a state of degeneration—*i.e.*, pus corpuscles. So far as we know it has served its purpose, its bactericidal action is almost, if not quite, exhausted, and, consequently, it has no further purpose to serve. Furthermore, its evacuation will help to diminish intra-abdominal tension. Septic absorption or toxæmia will be lessened and fibrin-coated surfaces will be enabled to come together and promote encapsulation of the infected area. Another probable result of the evacuation is the pouring out of a fresh exudate possessing strong bactericidal powers which can act under more favourable conditions, and the inflamed parts will consequently be placed to greater advantage for offering effective resistance.

The exact means by which the exudate is to be removed is a matter upon which opinions are widely divided and must now be considered. Generally speaking, the methods in vogue are—(1) Dry-cleansing or mopping up the fluid with sterilised muslin wipes, (2) flushing with sterilised saline solution, or by (3) these methods combined.

Now, with regard to dry sponging, if the fluid exudate could be cleared away by this means a great deal would be done towards assisting nature in overcoming the infective process. The difficulties, however, attending a thorough clearance are considerable, very obvious ones being the

complexity of the peritoneal enfoldings and the numerous recesses which render it such an easy matter for infected pockets or loculi to be overlooked. Damage of the delicate peritoneum, if it be rubbed too vigorously, is a real danger in connection with this process of dry cleansing. Such damage may lead to injurious consequences in two ways:—(1) By facilitating septic absorption by the blood vessels as the direct result of injury or detachment of the endothelium, and (2) by facilitating the subsequent formation of adhesions.

Supposing, by way of illustration, the pelvis and lower abdominal region involved and pervaded by a septic exudate (which is spreading progressively from below upwards), the operator working through a free (6-inch) abdominal incision would commence by lifting up the coils of intestine with one hand, while with the other a compress is passed down to the bottom of the cavity. Then proceeding upwards the iliac fossæ, lumbar hollows, and central abdominal zone—*i.e.*, the spaces between the coils of the small intestine—are successively examined, loculi are evacuated, and the parts gently wiped dry. The transverse colon and its mesentery sometimes form the boundary line between the inflamed and intact zones. Vigorous scrubbing of loops of intestine with a view to dislodge particles of adherent fibrin is not to be advocated, for in addition to requiring time and being calculated to increase shock it would probably do more local harm than good. Apart from cases in which the peritonitis is diffuse and spreading, dry sponging may be practised also if the exudate is localised or encapsuled, extreme gentleness being employed lest adhesions be broken down.

While speaking of dry sponging I may mention the fact that some surgeons of note (J. B. Murphy, of Chicago, being one) regard it with disfavour, more particularly if

the intestines are disturbed or displaced in different directions while the process is being carried out.

Flushing with sterilised saline solution (.9 per cent.) is a form of treatment which has been extensively practised, but it is open to question if it deserves all the merit that its advocates have attributed to it. In the first place, prolonged attempts at minute cleansing of the peritoneum by free flushing are attended by considerable risk in a patient already weakened and suffering from shock. In the second place, flushing may be the means of spreading infection to remote regions of the peritoneum not yet invaded. Its effect is essentially mechanical, and it cannot be regarded as having any disinfecting value. Of course, no surgeon in his senses would attempt peritoneal flushing with a strong antiseptic fluid.

Flushing, however, is sometimes of undoubted value, and may be said to find its principal indication in cases of gastric and intestinal perforation where solid particles of undigested food have been extravasated into the peritoneal cavity. Excluding perforation cases flushing may also be employed with advantage if the peritonitis is of the universal type—the puerperal form being a good example.

In order that flushing should be efficient it must be carried out in a systematic manner, commencing beneath the diaphragm both to the right and left of the suspensory ligament of the liver, around the spleen, and between the liver and stomach. Then each lumbar recess is taken in hand, the mass of small intestine being gently drawn aside, first to one side and then to the other. Subsequently the iliac fossæ and the pelvic cavity are flooded until the returning fluid is quite clear. A free abdominal incision, above all things, is needed on these occasions. The saline solution may be poured in from a jug, or, if preferred, it may be conveyed to the different peritoneal

recesses along a capacious rubber tube leading from a funnel or other suitable receptacle held a couple of feet above the level of the patient. This ensures a stream flowing with a moderate, but not excessive, degree of force.

If it be decided to employ flushing in the case of a localised peritonitis, or one which is undergoing progressive extension, the exudate had better be removed first by the aid of dry swabs, and then the flushing is carried out with a stream of saline solution at very low pressure, its free exit being at the same time fully provided for.

General flushing is much facilitated if during the procedure the intestines are allowed to escape through the abdominal incision, but this is by no means devoid of risk. If the patient's general condition is good and the heart's action strong no great danger may attend evisceration for a few moments, the intestines being well protected by smooth towels wrung out of hot saline solution, but if the opposite conditions obtain it had better not be attempted as it might produce a dangerous, if not fatal, degree of shock.

No matter what means be employed for removing the exudate the fact must not be overlooked that complete disinfection of the peritoneum is impossible, and that although the general condition of the patient may improve the infective matter remaining behind may determine later on the development of an intraperitoneal abscess. One should, therefore, be fully alive to the possibility of such an occurrence, and be prepared to meet it by appropriate means.

The question of peritoneal drainage must next be considered. As in other regions of the body, so in the case of the peritoneum, it is of the utmost importance that septic fluids should be conducted to the exterior and not allowed to collect *in situ*. In some instances drainage

can be satisfactorily carried out, more particularly when the fluid collection is encapsuled and situated in one of the peripheral districts of the abdomen—*e.g.*, the subphrenic space, iliac fossa. It is in connection with drainage of the general cavity of the peritoneum, however, that difficulties, apparently insurmountable, present themselves.

Drainage has been carried out in different ways, the principal means employed being:—(1) Tubes of rubber or glass; (2) capillary drains, a good example of which is the "cigarette drain," which consists of strips of iodoform or other variety of gauze surrounded by a thin layer of rubber tissue; (3) tamponnade. This consists of a gauze bag, which is first introduced by appropriate means into the affected district. Its interior is then filled with strips of gauze to the required extent. In addition, further efforts have been made to improve or facilitate drainage by suitably regulating the posture of the patient. In America the half-sitting-up posture is much favoured by Fowler and others.

In the majority of modern works on surgery elaborate directions are given for carrying out general peritoneal drainage by the aid of tubes or gauze or a combination of both. One is recommended to introduce these in different directions, as, for example, into the pelvis, iliac fossæ, lumbar recesses, between coils of intestine, and, perhaps, also into the subphrenic space. In the female, too, it is customary to recommend pelvic drainage to be carried out by the aid of a tube traversing a counter-opening in the posterior vaginal wall. It is only by slow degrees, however, that the futility of such measures has come to be fully realised. Elaborate attempts to effect drainage of the general cavity of the peritoneum require time, they lower peritoneal resistance and add much to the shock of

the operation. Furthermore, the end in view is really impracticable, because no matter what materials are employed—tubes or gauze-drains—they are quickly encapsuled by fibrinous adhesions. It has been shown by Dr. John L. Yates, of Chicago, that effective encapsulation of cigarette drains introduced into the peritoneal cavity of a dog may be demonstrated within five hours of their introduction, and when once such adhesions have formed drainage of course ceases. Some fluid does certainly come away and may reveal itself in the dressings, but one should not be deceived thereby, since it is merely serum or serous which oozes from the surfaces irritated by the drain and not from the peritoneal cavity.

Similar objections may be urged against the method of tamponnading associated with the name of Mickulicz. As a drain pure and simple the large masses of gauze which are introduced in his procedure have little value owing to the extreme rapidity with which encapsulation is effected, but nevertheless it is in connection with this very encapsulation that tamponnading may be truly beneficial. For example, in a case of peritonitis of slight extent, but not well circumscribed, such as one sometimes observes in appendicitis, the careful introduction of a large mass of gauze may be the means of walling off or encapsulating the infected area, and, therefore, rendering it extraperitoneal. The same important result may be obtained in the course of some operative procedure if it should appear likely that there was obvious risk of infection spreading to the general peritoneum. A precautionary packing of a given district, by creating a protective zone of adhesions, may prevent a calamity later on. Operations upon the biliary passages, appendix, and stomach are not infrequently supplemented by measures of this kind.

In advanced cases of acute peritonitis the difficulties become enormously increased when what I have alluded to as the secondary phenomena make their appearance—*i.e.*, abdominal distension, the result of intestinal paralysis and meteorism, coldness and lividity of the extremities, and weak heart action with a very frequent and feeble pulse. Indeed, under such circumstances the question which invariably presents itself to one's mind is—"Is it likely that any operative procedure will be of use?" Personally, I think that the surgeon who abstains from operating exercises a wise discretion. An operation under such conditions would merely take away what little chance the patient had of recovery and precipitate the fatal issue.

Should one, however, have to deal with a case in which it appeared that intestinal paralysis was impending, the cæcum might with advantage be opened and drained, a soft rubber tube ($\frac{1}{3}$-in. in diameter) being introduced in the way recommended by Witzel in connection with gastrostomy, or, as an alternative, the cæcum might be surrounded by gauze packing through a right iliac incision, so that later on if thought advisable it could be readily identified and opened.

Although enterostomy—*i.e.*, drainage of the small intestine—has received an extensive trial in cases of ileus, yet it frequently fails to improve matters, and possesses certain well-founded objections. Thus, to be efficient, two or three enterostomies would probably be necessary, one in the proximal side of the paralysed bowel, one in the paralysed segment and one in the cæcum. The introduction of one tube only into a paralysed segment of bowel would not be calculated to do much good owing to the arrest of its peristaltic contractions. Then, again, the introduction of one or more tubes necessitates a considerable degree of handling of the intestine, occupies time,

and adds to the shock. Furthermore, enterostomy openings sometimes exhibit an undesirable tendency to persist as fistulous openings, which, in the event of the patient surviving, would need to be closed later by operative measures. They are least likely to persist, however, if made on the Witzel principle.

The method of Dahlgren, of incising the distended bowel near its mid point and squeezing out its contents, both from above downwards and from below upwards, until it has been thoroughly emptied from the termination of the duodenum to the cæcum sounds plausible in theory, but it necessitates extensive evisceration, takes time to carry out, and throws too great a strain upon the recuperative powers of the patient. In spite of these objections, however, several successes have been recorded in desperate cases in which it has been carried out. As an alternative to the measures for emptying the distended bowel just mentioned some advocate frequent washing out of the stomach by way of ridding it of its dark, foul contents. Large watery enemata to wash out the rectum may also be employed with benefit.

The importance of careful *post-operative* treatment of peritonitis cases cannot be too strongly emphasised. Intravenous or intracellular injections of saline solution possess a high therapeutic value. They increase the strength of the heart and help to raise the arterial blood-pressure. They stimulate the tissues also, and increase their resisting power. Furthermore, they excite renal activity and promote the elimination of toxins. To be of use they (saline injections) should be copious—one to three pints—and should be repeated at intervals until the condition of the circulation shows signs of improvement. With evidence of returning peristalsis purgatives may be administered, but so long as the intestine is in a paralysed

state they must be regarded as injurious. For weak heart action decided benefit may follow hypodermic injections of digitalin and strychnin.

In conclusion, I must apologise for the undue length of my paper. I feel it has been very incomplete, but should it be the means of eliciting a free discussion my main object in bringing the subject forward will have been attained.

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THE PRESIDENT regarded the administration of morphin in peritonitis cases, as a rule, unwise; it might, however, be useful before operation. Flushing of the peritoneum tended to revive the patient and stimulate the peristaltic action of the intestine. He was inclined to sanction operative measures even in desperate cases, as they alone appeared to offer any prospect of recovery. He related the clinical history of a patient under his own care in whom recovery followed operation, although everything pointed at first to a speedily fatal issue.

MR. R. CHARLES B. MAUNSELL considered morphin before operation harmful, as it tended to cause flatulent distension of the intestines. His own practice was to mop out and dry the peritoneum with gauze, and drain in cases of diffuse (not generalised) peritonitis. He did not flush under such conditions. He described the method which he usually carried out when flushing was indicated. Two openings were necessary, one above and the other below the umbilicus in the hypogastrium.

DR. GOULDING was not strongly opposed to the use of morphin, he regarded it of enormous value in relieving pain. He was in favour of flushing as a means of cleansing the peritoneum.

# VOLVULUS OF THE CÆCUM TREATED BY REDUCTION AND APPENDICOSTOMY, WITH REMARKS UPON THE OPERATION OF APPENDICOSTOMY.

By R. CHARLES B. MAUNSELL, M.B., F.R.C.S.I.;
Surgeon to Mercer's Hospital, Dublin.

[Read in the Section of Surgery, March 23, 1906]

The communication which I bring before you this evening is of interest, firstly, because in it is recorded an example of a rare form of intestinal obstruction; secondly, because the line of treatment adopted is novel and gives an opportunity, for the first time in Ireland, of discussing a very simple operation, which, in my opinion, has a very useful future.

Mrs. Anne B., aged seventy-seven years, twice widowed, large family, was admitted to Mercer's Hospital on January 12, 1906. She was a very brown-skinned, wiry-looking old woman, who stated that up to 6 30 p.m. on January 11 she had practically never been ill, but that she had always been subject to obstinate constipation. On that evening, whilst at tea with her family, she was suddenly seized with violent pain in the umbilical region, and her abdomen became swollen and hard within a few minutes. Next morning she was seen by Dr. Knapp, who administered an enema without result, and advised her to go to hospital. This advice was not acted upon until the evening. When I saw her her temperature was normal, pulse 120, and she seemed weak after her journey to hospital, but said that her pain was less. Examination of the abdomen revealed fulness below the umbilicus, rather more marked on the right side. The muscles were not very rigid, but there was distinct tenderness over the distended area. Vaginal and rectal examination gave no further information. A turpentine enema was ordered, but

the result was again negative. However, as the pulse-rate was distinctly falling, we decided to allow the patient to rest before deciding upon operation. Next morning, January 13, she felt rather better, and the pulse-rate had fallen to 92. During the day it again rose to 108, so I decided to operate. At no time had there been any vomiting. When the abdomen was opened a tensely distended cæcum and ascending colon was seen filling the lower abdomen and pelvis. This was deflated and withdrawn, when it was found that the cæcum and portion of the ascending colon had made a complete turn from below upwards and from right to left. The lower portion of the ileum, having been carried in front of the colon, was tightly wound around the neck of the strangulated large intestine. The twist having been reduced, it was found that the cæcum and colon had a well-formed mesentery, thus rendering volvulus a possible and likely accident. Having closed the incision which had been made for deflation I determined to fix and drain the cæcum by performing the operation of appendicostomy. In this instance I had to ligate and divide portion of the meso-appendix, but took care to leave sufficient blood supply to the portion near the cæcum. A stab wound was made at the outer border of the rectus, and the appendix drawn through and fixed by two sutures, its distal end amputated, and its lumen dilated with sinus forceps. A gum elastic catheter was then passed through it into the cæcum. and fixed in position by an encircling ligature. The after history of the case was uneventful, except for some slight suppuration which occurred in the abdominal wound about eight days after operation, evidently due to infection of the incision when the intestine had been opened for deflation. The after history of the appendicostomy is of interest. The catheter was left in position for four days, when the bowels were well cleared out by castor oil. From the first a small quantity of fluid fæces and a large quantity of intestinal gas escaped through the catheter, thus keeping the intestines free from gaseous distension, and rendering the patient's convalescence most satisfactory. As soon as the appendix had completed its mission it became necessary, or at least advisable, to close the little opening. Up to the present operators who have performed appendicostomy have considered it necessary

to open the abdomen and formally excise the stump of appendix from the cæcum. It occurred to me that this was an unnecessarily severe sequel to such a trivial operation, and that simple excision or invagination of the mucous lining of the stump of appendix should suffice, as the muscular tube which would be left would soon cicatrise. I found that it was extremely easy to excise the mucous lining by means of a dissecting forceps and a tenotomy knife, the muscular tube healing soundly within a few days.

On March 30, 1906, I again made use of the appendix in this manner in the treatment of a girl of eleven years, from whom I had to remove some four feet of small intestine for acute strangulation by an omental band. The chances of the little patient were practically hopeless from the start, but although the event was fatal, yet the appendicostomy opening worked well, and prevented abdominal distension.

I have determined to give this operation a very thorough trial as a preventive of distension in emergency intestinal resections or in operations for diffuse or general peritonitis. Up to the present I have sometimes used Paul's glass tube in such, but now I am of opinion that we have found a simpler, and equally effective, method of preventing ileus.

Beyond recording the facts as stated above I have little left to say, as the ground has been taken from under me by Mr. Keetly, who has ably dealt with this subject in the *British Medical Journal* of October 7, 1905, and by Sir William Bennett, in the *Lancet* of February 17, 1906. I may, nevertheless, mention the indications which these surgeons enumerate, and bring this communication to a close with my own appreciation of this attempt to turn the appendix from its evil ways and make it a useful member of the community of abdominal viscera.

Mr. Keetly has collected all the records of this operation from R. F. Weir's pioneer case down to the date of

his communication, and suggests the following as indications:—(1) Mucous colitis, (2) dysentery, (3) chronic ulceration of the colon, (4) chronic constipation—in these conditions the opening is used for lavage and medication, (5) to fix and drain an ileo-cæcal intussusception, (6) to drain and prevent distension subsequent to operations for intestinal obstruction, or when intestinal resection has been performed. In these instances it is used as a prophylactic measure.

Sir William Bennett enlarges this list by including the following suggestions:—(1) As a method of applying local treatment in complicated enteric fever, as suggested by Dr. Ewart, (2) as an improvement upon rectal feeding, (3) as a substitute for gastrostomy or jejunostomy in very weak and emaciated patients.

I most heartily concur with all these suggestions, and have here recorded the further indication of fixation of a volvulus of the cæcum, and suggest that it should also receive an exhaustive trial as an aid in the treatment of diffuse or general peritonitis, arising from any cause, when a paretic condition of the intestines is present.

# A FURTHER SERIES OF ENUCLEATIONS OF THE PROSTATE.

By SIR WILLIAM THOMSON, C.B., F.R.C.S.;
Surgeon to the Richmond Hospital;
Hon. Surgeon to the King.

[Read in the Section of Surgery, May 11, 1906.]

In a paper read before this Section of the Academy and in communications to the journals I have already written on the removal of the enlarged prostate by the suprapubic route. I have dealt with the question whether the high operation or the perineal is the more generally applicable, and which is the safer and the quicker. These are very important considerations when we remember that the majority of our patients are of advanced age, broken down by the insufferable distresses and the pathological mischiefs of the affection; and after some experience I may state my position. I adhere to the view which I originally expressed—that the suprapubic method is in most cases the best. I am aware, of course, that this opinion is not universally held, but I think I may assert confidently that the great majority of those surgeons who have operatively treated enlarged prostate have pronounced in favour of the suprapubic procedure.

To-night I do not intend to raise any serious controversial topic. Who was the originator, whether the gland is removed with its capsule, or without it, are not matters with which I shall venture to trouble you. But I wish to record some additional cases in my own practice, and to refer to a few points which have interested me. The operation has sprung into much prominence, and has been

widely practised, but as in all cases of new methods there is a good deal to be learned and reported before we arrive at the high level of great comparative safety.

*Results.*—I submit a tabular list of the cases of enucleation which I have so far done, and the structures which I have removed. They number eighteen in all. The list

| | Age | Date | Result |
|---|---|---|---|
| 1. J. I. | 66 | 1902 | R. |
| 2. J. D. | 75 | 1902 | D. |
| 3. J. T. | 60 | 1902 | R. |
| 4. W. H. | 63 | 1902 | R. |
| 5. U. E. | 68 | 1903 | D. |
| 6. T. W. | 53 | 1903 | R. |
| 7. M. H. | 70 | 1904 | D. |
| 8. P. C. | 76 | 1904 | R. |
| 9. W. D. | 70 | 1905 | R. |
| 10. J. L. | 70 | 1905 | R. |
| 11. A. M. | 60 | 1905 | R. |
| 12. J. R. | 58 | 1905 | D. |
| 13. J. L. | 70 | 1905 | R. |
| 14. C. M'P. | 74 | 1906 | D.* |
| 15. M. N. | 54 | 1906 | R. |
| 16. J. S. | 72 | 1906 | R. |
| 17. J. G. | 70 | 1906 | R. |
| 18. B. B. | 65 | 1906 | R. |

does not include cases in which I have explored the bladder by the superior incision or established a fistula when the patient's condition was so bad or the age so advanced that it would have been a fatal procedure to carry out enucleation, or cases of malignant disease; nor do I include a case which I did two months ago, in which all the symptoms of prostatic obstruction were present, but with no evidence of enlargement in the rectum. It was one of the rare examples of prostatism without enlargement, but it

* Twelve weeks later, of gangrene of lung.

does not come within the scope of the present communication. Nine patients were over seventy years of age; the youngest was fifty-four and the oldest seventy-six. Two of the tumours were of very large size—$6\frac{1}{4}$ ounces, and another 10 ounces less a few grains. Three came away in one mass, including the prostatic urethra. The immediate and remote results did not differ from those following enucleation of the lobes separately. The patients have had no difficulty in emptying the bladder, there has been no irritation or symptom of stricture at the torn vesical extremity of the urethra, and the function of easy urination has been completely restored.

*Phosphates.*—One of the troubles which sometimes are associated with the operation is the deposit of phosphates on the edges of the wound. I have had several instances of this. Confined to the edges one expects that these deposits will clear away in about ten days, but they are not always limited in this way. In Case IV. this occurred. The encrustation was very extensive and persistent. The patient had so much distress after some months that I was compelled to open the bladder again. I found the mucous membrane coated with phosphates, and there were two phosphatic calculi. These were removed and the deposit was dealt with. There was subsequent copious irrigation, and suitable internal treatment, but when he went home a good deal of irritation still remained, and there had been a recurrence of phosphates. This is the only case in which there has been any persistent phosphatic deposit.

When the prostate has been removed the covering of it which remains in the bladder is very thin. It has been in some parts subjected to much bruising, and its vitality is distinctly lowered. Some of this occasionally dies, and upon it deposits of phosphates may occur. In two cases this happened, and the fragments, finally detached, were

extruded through the wound. This offers another reason why the opening into the bladder should be shaped by a large tube, about three-quarters of an inch in diameter, for it affords ample space for free washing out and the carrying away of *débris* and deposit.

In my last ten cases this condition has occurred only three times. In the instances in which there has been no appearance of it I have noticed that there has not been any preceding chronic cystitis, the patients have responded to preliminary treatment satisfactorily, and the bladder has been brought into a fairly healthy state by rest, the careful use of the catheter, washing out, and the administration of some drug to secure acidity of urine. When the symptoms allow of such a course I regard it as of the utmost importance. I have tried the acid phosphate of soda and several other drugs in the post operative course of the case, but I think on the whole I have had the most satisfactory results from benzoate of soda in ten-grain doses, with a drachm of tinct. of buchu, three or four times a day.

*Flushing.*—But with this must be associated copious flushing of the bladder with boric solution. I have pointed out the importance of a large bladder opening. For some time I have rarely used the catheter for washing out. I suspected that it sometimes did mischief, and so I adopted the plan of first flushing through the upper wound. But this alone is apt to be deceptive. If you pass a stream directly through the bladder wound you will soon find that the fluid is returning perfectly clear. But this current does not effectively stir up the deposit which is lying about the base of the bladder and the original site of the prostate. When I have finished this stage of the washing I pass into the urethra a glass nozzle, about three or four inches long. It should have as wide a mouth as

it will carry. Attached to a syringe or an irrigator it conveys the fluid in a full stream into the bladder. The clots or other deposits of pus and phosphates are displaced, mixed with the current, and discharged through the suprapubic opening. You will be often surprised to find how much dirt you will get out of a bladder which you may regard as perfectly clean if you confine yourself to the single route washing.

*Sloughing.*—A more serious danger is the existence of extensive sloughing in the wound and the infection of the layers of cellular tissue in continuation with it. This is especially apt to occur in patients who have large and pendulous abdomens. I lost Case VII. by infection of the deeper parts of the space of Retzius. Sloughing occurred, and it was only towards the end of the third week that the patient showed urgent symptoms. Then I discovered an abscess which I opened above Poupart's ligament, but he died on the twenty-third day, although I had regarded him as quite safe a week before.

A fortnight ago I operated on a gentleman (Case XVIII.) of this type, assisted by Mr. Tobin, Mr. H. Rutherford, and Dr. Boyd.

He had long been troubled with urinary difficulties, but the week before, for the first time, he had complete retention. He was seen by Dr. Gorham, of Clifden, and Dr. Loftus, of Roundstone, but they failed to get in a catheter, and Dr. Gorham very skillfully aspirated above the pubis. As the obstruction could not be overcome, the operation was repeated next day, and the patient was at once sent on to Dublin—a distance of 160 miles. I saw him the same evening, and, after some difficulty, succeeded in reaching his bladder. He was in a very low state, and there was cystitis. The prostate was so large that my finger in the rectum could not reach its upper limit. I treated him for a week, and operated on 26th of April. The wound passed through nearly three inches of fat, the bladder was quickly reached

and opened, and I then found a prostate of enormous dimensions almost filling the cavity. The right lobe was huge, as I show you, and came away in three portions. The left is much smaller, and was removed in one piece. The total weight is ten ounces, less a few grains, and is the largest I have removed. The enucleation lasted 25 minutes. The upper portions were quickly freed, but the attachments at the base were very close, and required, finally, the use of the two first fingers before the gland could be delivered. Now, in this case I had to deal with a great deal of superficial fat, and a large wound in the abdominal wall was necessary. When my fingers were in the bladder my hand had disappeared in the gap of the surface wound. Much force was necessary, and the operation was most tiring to the hand. In upper part the edges of the wound have united perfectly. On the third day, however, signs of extensive sloughing appeared. The process passed under the abdominal walls on either side for a couple of inches, and the edges lost colour and necrosed. This was sufficient to cause much anxiety.

This untoward complication is especially apt to occur in fat subjects. The tissue is itself of low vitality, and in burying the hand in the wound bruising of the parts is likely to accelerate necrosis.

What I did was to remove a couple of stitches to enable me to expose the deep parts, and then these were bathed in 30 per cent. solution of peroxide of hydrogen. This has been done at each dressing. The temperature has remained normal, the sloughs are separating, the line of demarcation is well established in the skin, and the patient is, I am glad to say, progressing rapidly to recovery.

*Hæmorrhage from the Prostate.*—Case XI. was one of much interest because of the diversity of the views which from time to time were held regarding it. It was diagnosed as stone in the kidneys and malignant disease of the bladder. My own independent declaration was that the case was one of enlarged prostate, with possibly a stone in the bladder. I have already published the full

details of the case in the *British Medical Journal* of Jan. 27, 1906, but I may here allude to one or two points of great interest:—

The patient was examined in London, and no stones were found. In two days he had retention for the first time, having never previously needed the use of a catheter. He was sent home, and I found him suffering from bad cystitis. In a fortnight he had a bad attack of hæmorrhage, and in spite of all I could do, by means of styptics internally and locally, the bleeding continued. He was greatly weakened, and, having regard to his alarming condition, I suggested that the bladder should be opened and the prostate removed. In this view the gentlemen who helped me in consultation concurred, and the operation was duly performed. The hæmorrhage immediately ceased. I found no less than 32 calculi, which I show you. The prostate weighed 2 ounces. The patient is now perfectly well, and has never had the least return of his former symptoms, although he suffered for a time from a painful spot in the scar which had to be excised.

The failure by an experienced surgeon to find the stones is only another instance of the difficulty that sometimes impedes us in diagnosis. The important matter, however, is the carrying out of a treatment for the hæmorrhage, which, so far as I know, had not before been reported, and I submit it to the Section as an advance in the treatment of such cases which may be established. If we come to the conclusion that the bleeding is from the prostate, and if the discharge is continuous and excessive, not yielding to any other known remedy, I regard the proceeding as urgently called for. In these cases the covering of the gland is often exceedingly vascular, and the veins are enlarged. If from ulceration or other cause a large continuous hæmorrhage is established, particularly from an open vessel, it does not seem reasonable to hope that it will be stopped by styptics. We cannot apply pressure, and we cannot hope that a clot will help us out of the danger,

for the temporary covering is certain to be disturbed by the action of the bladder in its efforts to get rid of an offending body. Urine is constantly distilling into the cavity, and helps to increase the expulsive efforts of the patient, so that the essential condition of rest for the permanent healing of the vessel is absent. What, then, can we do in such a case? To my mind there is no other way open to us but to expose the seat of bleeding, to enucleate the prostate if that be necessary, or to plug the bladder.

*An Abdominal Tumour.*—Case XV. was sent to me as a tumour of the abdomen. It had been seen by several medical men.

The swelling was very easily observed, occupying the middle of the abdomen and extending above the umbilicus. The patient was able to pass a normal amount of urine in a fair stream, but he was disturbed two or three times at night. He felt no pain, and was able to hold water for four or five hours without distress. The tumour was hard, but it did not give the feeling of solidity. I found that he had an enlarged prostate, and on passing a catheter I drew off 58 ounces of urine. This re-accumulated rapidly, and the next trial produced three pints. It was a case of atony due to over-distention, and after a few days I removed his prostate, and in five weeks he went home perfectly well, the tone of the bladder having been quite recovered.

I remember some years ago seeing a case which had been under the care of a surgeon, since deceased, who had declared that the patient was suffering from malignant disease of the colon, and as the gentleman was eighty-four years of age he was advised that operation would be inadvisable. I found a curiously oblong tumour passing obliquely upwards to the right side, and reaching nearly to the liver. Tracing it downwards it passed into the pelvis in the central line. It was dull on percussion, but

not solid. I found that he had a very large prostate, and on asking if he had difficulty in passing urine I elicited all the usual symptoms. A catheter solved the difficulty, for the tumour promptly disappeared. I mention this case in connection with the other in order to show that even an experienced surgeon may be misled by a distended bladder, and that the possibility of such a thing should never be forgotten when dealing with tumours of the abdomen.

*Dangers of Operation.*—What of the dangers of the operation? Apart from the fact that we are dealing with aged persons, who are often broken down by suffering of the most distressing character, there are undoubtedly risks of a serious kind. We make an opening into the bladder suprapubically, and the escaping urine, in spite of drainage tubes or siphonage, does to some extent come into contact with the wound. If the urine is from a bladder which has been severely inflamed, and is putrid, the dangers are increased. It is of importance to limit the risks as much as possible. In the first place, I always secure the cut edges of the bladder wound to the fibres of the separated rectus muscle. Besides lessening the chances of extravasation it has the advantage that when changing the drainage tube the sutures on either side serve as a guide in its re-introduction, and we are spared the risk of breaking down adhesions by trying to push the tube through an opening which in the early stages rapidly narrows.

Then the surgeon is often alarmed by the perilously close approximation of the finger in the bladder to the finger in the rectum. In a thin bladder it sometimes feels as if the least additional effort would make the fingers actually meet. The accident has happened in more than one case; but let me say in passing that the perineal operation cannot claim immunity in this respect, for several cases of recto-vesical fistulæ have been reported

as a result of that procedure. I refer to this matter simply to emphasise the lesson that while undoubtedly we must use much force in some cases where the connecting fibres are very tough, our violence must be gentle, if I may so say, and, above all things, under control. There must be no rough pulling upon bands, but a careful peeling off of all attachments, with the finger nail always directed close to the surface of the prostate.

In some cases the peritoneal fold falls freely into the upper part of the wound, and ought to be carefully protected. This may be done by a retractor of the Simon type, or it may be tucked up under a pad of sterile gauze and given in charge of an assistant.

*The Trendelenburg position* is of use if a close inspection of the interior of the bladder is required, but I never use it for getting the peritoneal fold out of the way. As is now admitted, the position is attended by risks, and in the case of the old patients with whom we have to deal it is especially dangerous to crowd the viscera against the diaphragm and so interfere with the action of the lungs and heart.

*Primary Hæmorrhage.*—As to free primary hæmorrhage, I have only encountered it once, and I have already reported that case. I have for some time adopted the plan of administering ten-grain doses of chloride of calcium three times a day for one and a half or two days before operation. The result has been entirely satisfactory, and the bleeding during the actual enucleation has been very small.

*Drainage.*—At the close, water as hot as can be borne by the finger is used to douche the bladder until it returns quite clear, then the disturbed membrane in the position of the prostate is gently replaced, and the tube is secured in the wound. A rectangular glass tube, to one arm of

which a rubber tube has been fixed, is passed into the bladder, and to the other arm, which lies on the abdomen, supported by a layer of wadding, a long rubber pipe is attached and passes into a bottle holding a known quantity of water, the level of which is marked. Any rise above this point shows whether urine is flowing, but this can always be seen by looking at a glass joint fixed midway in the length. This plan has been used by Sir Thornley Stoker, and I have found it very serviceable in the first three or four days during which the tube is retained in the bladder.

*Fatal Cases.*—The mortality may be thus summed up:—One died of ether bronchitis—he was aged seventy-five, and suffered from mitral disease; one died fourteen days after operation from a suddenly-developed peritonitis; one from pelvic cellulitis; one died in twenty-four hours from sepsis; and one died twelve weeks after operation from gangrene of the right lung. This case was sufficiently well to be out of bed for a couple of weeks, and the wound was nearly closed, when he had an attack of purpura hæmorrhagica. He wasted considerably, and all progress ceased. He recovered from this, but four weeks later he had another attack of purpura. Blood came from the bladder, lungs, nose, and intestine. He developed cough and much bloody expectoration. At the *post-mortem* the right lung was in a state of gangrene. This death can hardly be attributed to the operation, and if I omit it I have lost only one in the last ten.

*Cases for Operation.*—I may say, however, that I have never refused to operate in any case, no matter how feeble or advanced in years, when the question to be dealt with was the attempt to relieve the patient from intolerable distress. I have treated many by means which are generally accepted as less heroic and so often capable of giving

a large degree of comfort. It would be very foolish to lay down the law that all cases of enlarged prostate are to be operated upon. Many men have enlarged prostates, but certainly not all enlarged prostates demand removal. But I have no doubt that if the nocturnal distress is great, if the patient has had recurring attacks of retention, if he has suffered from outbreaks of cystitis, if he has had severe hæmorrhage, if he has suffered from any one or all of these, then operation ought to be undertaken. The risks attending these troubles are in a sense more certain than the risks of enucleation. The gratitude of a patient who has been restored to the ordinary method of urination, whose sleepless nights and frequent painful efforts to empty the bladder have gone for ever, impels one who has to do with such cases to urge the advantage of operation. The patients seem to rejuvenate, and are enabled to live a life of peace, at least in this respect.

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Sir Thornley Stoker expressed himself in doubt as to the accuracy of statistics concerning the mortality resulting from operation for prostatic enlargement. The time required for prostatic enucleation, in his experience, varied. He had enucleated a large prostatic growth in two minutes, but in another case in which the growth was small the enucleation took half an hour. He recommended benzoate of sodium as a useful drug for promoting acidity of the urine. He considered the Trendelenburg position attended by danger in the case of aged patients.

Sir Arthur Chance favoured operative measures directed towards the relief of patients suffering from the effects of senile prostatic enlargement. He had found large prostates easy to deal with, and he had frequently noticed that small prostates gave the most trouble. In fatal cases the cause of death was usually intra-thoracic complications. He regarded the Trendelenburg position of great assistance, and he had not found it attended by any obvious risk.

Sir William Thomson, in replying, stated that there was no direct relationship between the degree of prostatic enlargement and the intensity of the symptoms. He alluded to cases of death following suddenly after operation, and which were due evidently to embolism. With regard to washing out the bladder, he usually did so through the urethra forty-eight hours after the enucleation.

# A NOTE ON BLADDER TUMOURS.

By LEVESON-GOWER GUNN, M.D. Dubl., F.R.C.S.;
Assistant Surgeon, Adelaide Hospital.

[Read in the Section of Surgery, May 11, 1906.]

Tumours of the urinary bladder may be divided into two great classes—malignant and benign. The latter are nearly always covered with villous processes. The former may or may not be so covered. If they are smooth on the surface the name "bald carcinoma" is commonly applied to them.

Whatever be the nature of the growth, clinically the stages by which it progresses are the same. We have first the stage during which the growth develops, but causes no symptoms, and consequently there is no means of diagnosing its presence. The second stage commences as a rule with a hæmorrhage from the tumour. In over 70 per cent. of all recorded cases this has been the first symptom. Two other symptoms may be associated with this hæmaturia. They are kidney ache and the sudden stoppage of the flow of urine during the act of micturition. If the tumour grows at or sufficiently near the mouth of a ureter to cause some obstruction to the flow of urine from it, and in consequence some back pressure on the kidney, and with this pain in the kidney region, the sudden stoppage of urine can only occur if the tumour is situated close to the internal opening of the urethra, or has a very long pedicle which allows the growth at times to block the internal meatus during the act of micturition.

The third stage of the affection consists in the onset of cystitis, and later on pyelitis, with the usual symptoms of

these diseases. Whether the tumour be malignant or benign unless treated it will sooner or later kill the patient. In benign tumours the fatal termination is usually brought about in one or other of the following ways:—

(1) By continued hæmorrhages.

(2) By one profuse hæmorrhage.

(3) By septicæmia following on the cystitis.

(4) By uræmia subsequent to destruction of the kidneys by pyelitis.

The longest history of such a case of benign tumour that I can find recorded is eleven years. Death, as a rule, occurs sooner than this.

The malignant tumour kills in about two years. The bald type of carcinoma grows more rapidly than the villous covered. Some of these latter tumours seem to have a comparatively low form of malignancy. Cases are recorded of patients living five or six years with such growths. Secondary growths are liable to occur anywhere, but most commonly show themselves first in the inguinal or lumbar glands.

It is somewhat suggestive that in only four of these nine cases was the diagnosis of tumour made before cystoscopic examination of the bladder had been carried out, and in three of these four the disease was too far advanced to permit of any operative interference. Even from these small number of cases I think we may conclude that the cystoscope is the only sure method of diagnosing such cases without operative exploration, except in a case where the growth has already attained a large size.

Is the making of this diagnosis of much advantage to the patient? I think it is of the greatest importance. I have already pointed out that even the presence of a benign tumour is dangerous. The sooner such a growth can be

diagnosed and removed the better, for it is not improbable that such papillomata may be the starting point of a carcinoma.

Again, in the case of a malignant growth, as long as the tumour has not infiltrated the muscular wall of the bladder its removal is a comparatively easy matter. Should this infiltration have occurred the tumour may still be removed with success (if it is not growing from the trigone) by resecting a portion of the bladder wall with the carcinoma. Then, should the malignant growth prove on examination to be obviously inoperable, all further instrumentation of the bladder may be avoided, with great advantage to the patient, as any attempt to use instruments in such cases can only do harm by setting up severe bleeding, or adding to the miseries of the patient by bringing on cystitis.

It is often a difficult matter for the pathologist, in dealing with these bladder tumours after their removal, to be quite sure whether they are benign or malignant. It is obviously impossible for the surgeon to be sure of this by a cystoscopic examination.

Briefly, then, I think that all vesical tumours should be removed, if possible. If the growth is benign the patient will be cured. If the growth is malignant recurrence, unfortunately, is likely to take place, but the patient's sufferings will in all probability be much lessened by the operation, and his life prolonged.

As to the route by which such tumours should be removed I think the suprapubic is always to be preferred to the perineal.

# ABSTRACTS.

## SECTION OF SURGERY.

*Friday, November* 3, 1905.

THE PRESIDENT in the Chair.

THE PRESIDENT made some introductory remarks.

MR. T. E. GORDON read a paper on "Gastric Surgery" (see page 154, *ante*).

MR. J. S. M'ARDLE read a paper on "The Vicious Circle in Gastric Surgery."

### *Living Exhibits.*

MR. W. S. HAUGHTON—Patient after resection of the lower jaw.

MR. D. KENNEDY—(*a*) Patient treated by gastro-enterostomy; (*b*) Patient after resection of lower jaw.

MR. G. JAMESON-JOHNSTON—Case of Charcot's knee-joint and perforating ulcer of the foot.

### *Card Specimens.*

MR. A. BLAYNEY—Gall-bladder with calculus impacted in the cystic duct.

MR. W. S. HAUGHTON—(*a*) Sarcoma of lower jaw; (*b*) Breast cancer with tuberculous axillary glands; (*c*) Papilloma of urinary bladder.

MR. KENNEDY—(*a*) Calculus removed from common bile duct; (*b*) Calculus from kidney; (*c*) Calculus from urinary bladder.

MR. WHEELER—(*a*) Dermoid cyst of ovary; (*b*) Renal calculus.

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*Friday, December* 1, 1905.

MR. T. E. GORDON in the Chair.

MR. GUNN read a paper on "The Surgical Treatment of Tuberculous Disease of the Seminal Tract" (see page 162, *ante*).

MR. W. S. HAUGHTON and DR. ROWLETTE contributed a paper on "Sterilisation of the Hands" (see page 175, *ante*).

MR. R. A. STONEY read a paper on the same subject (see page 184, *ante*).

*Living Exhibits.*

MR. HAUGHTON—Patient treated for rupture of the kidney.

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*Friday, January* 12, 1906

THE PRESIDENT in the Chair.

MR. R. CHARLES B. MAUNSELL read a paper entitled "Remarks on Gastro-enterostomy, with description of a New Clamp" (see page 199, *ante*).

MR. WILLIAM TAYLOR read a paper on "Partial Gastrectomy for Pyloric Tumour" (see page 208, *ante*).

*Living Exhibits.*

MR. A. BLAYNEY—Patient illustrating area of anæsthesia after excision of the Gasserian ganglion.

MR. R. A. STONEY—Case of gangrene of the toes.

MR. W. TAYLOR—Case of partial gastrectomy.

*Card Specimens.*

MR. R. A. STONEY—Cancer of rectum.

MR. W. TAYLOR—Portion of stomach removed for malignant disease.

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*Friday, February* 23, 1906.

MR. L. G. GUNN, F.R.C.S., in the Chair.

MR. D. KENNEDY read a paper on "Appendicitis" (see page 218, *ante*).

MR. A. B. MITCHELL read a paper on "Excision of the Scapula for Neoplasm" (see page 232, *ante*).

*Living Exhibits.*

MR. A. B. MITCHELL—Patient after excision of scapula.

MR. R. A. STONEY—Case of jejunostomy.

*Card Specimens.*

MR. BLAYNEY—(*a*) Hydronephrotic kidney; (*b*) Gall-bladder containing gall-stones.

MR. MAUNSELL—(*a*) Two specimens of gastric carcinoma removed by partial gastrectomy; (*b*) Pyonephrotic kidney.

MR. A. B. MITCHELL—(*a*) Cystic kidney removed for hæmaturia; (*b*) Emyphysematous tumour of the intestine; (*c*) Scapula excised for neoplasm; (*d*) Skiagrams of scapula before and after excision.

MR. EDWARD H. TAYLOR—(*a*) Resected segment of stomach; (*b*) Cæcum and part of ascending colon removed for malignant disease; (*c*) Cæcum, ascending colon, and part of the transverse colon resected for chronic intestinal obstruction, the result of tuberculous disease.

MR. WILLIAM TAYLOR—Cæcal tumour, apparently malignant, removed from female patient, aged eighteen.

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*Friday, March* 23, 1906.

THE PRESIDENT in the Chair.

MR. EDWARD H. TAYLOR read a paper on "Treatment of Acute Peritonitis" (see page 239, *ante*).

MR. R. CHARLES B. MAUNSELL read a paper on "Volvulus of the Cæcum treated by reduction and Appendicostomy" (see page 257, *ante*).

*Living Exhibits.*

MR. EDWARD H. TAYLOR—Case of partial gastrectomy and gastro-jejunostomy for malignant disease of stomach.

MR. W. DE C. WHEELER—Two cases of fractured patella treated by wireing.

*Card Specimens.*

MR. J. S. M'ARDLE—(*a*) Safety-pin removed from left bronchus; (*b*) Portion of tracheotomy tube removed from bifurcation of trachea; (*c*) Plate of teeth removed by œsophagotomy; (*d*) Skiagrams of foreign bodies removed; (*e*) Fibromyoma removed from left broad ligament; (*f*) Faulty Murphy button; (*g*) Foreign bodies removed from urinary bladder—bougie, pencil; (*h*) Calculus removed from bladder by suprapubic route.

MR. R. CHARLES B. MAUNSELL—(*a*) Malignant tumour of kidney; (*b*) Malignant tumour of ovary.

***Friday, May* 11, 1906.**

The PRESIDENT in the Chair.

SIR WILLIAM THOMSON read a communication on "A further Series of Enucleations of the Prostate" (see page 261, *ante*).

MR. L. G. GUNN read a note on "Bladder Tumours," and gave a lantern demonstration on the subject (see page 274, *ante*).

*Living Exhibits.*

MR. G. JAMESON JOHNSTON—Patient after nephrectomy.

MR. R. A. STONEY—Patient after excision of the lower jaw, including the zygoma.

*Card Specimens.*

SIR WILLIAM THOMSON—Enlarged prostates removed by enucleation.

MR. G. JAMESON JOHNSTON—Tuberculous kidneys removed by operation.

MR. R. A. STONEY—Tuberculous testis.

# SECTION OF OBSTETRICS.

## THE TREATMENT OF PUERPERAL ECLAMPSIA BY LARGE DOSES OF MORPHINE, WITH A SERIES OF HITHERTO UNPUBLISHED STATISTICS FROM THE ROTUNDA HOSPITAL, DUBLIN.

By ROGER DE LA HARPE, M.D., Switzerland;
Formerly Second Assistant to Prof. E. Bumm, Women's Hospital, Basle.

[Read in the Section of Obstetrics, November 17, 1905.]

There is no subject in obstetrics to which a greater interest attaches than to that of eclampsia. It may with truth be said that our knowledge of its pathology is as obscure as the symptoms of the disease are well known. Theorists, however, of recent years have shown a remarkable agreement in attributing the symptoms to an auto-intoxication of some kind. It seems reasonable, from anatomical indications, to assume the truth of this; but as to whether the poison is generated in the liver or in the kidneys, or is absorbed from the intestines, it is not the purpose of this paper to discuss. Neither is it intended to deal with the tissues in which it is most likely to be deposited. Much confusion has arisen from, and much harm has followed, the dogmatic statements of would-be authorities concerning this disease; statements that can in no way be substantiated. For example, Edgar writes:—"Expectant or palliative treatment will almost surely be followed by death of the child, and about one-third of the mothers succumb (!) But if the uterus is promptly evacuated by suitable surgical means the child's life is preserved and the mother is practically subjected to no danger."

It will be shown later, on what a small foundation of fact these statements are based; but although such assertions as these may be disproved they will in all probability influence the treatment for many years. Operative treatment, in the writer's opinion, is to be condemned as dangerous and useless. It is a fact that in many cases the fits continue after the uterus is evacuated, as proved by the following statistics:—In Schauta's Clinique, with a total of 342 cases of eclampsia, in 82 cases the fits originated after the birth of the child. In 185 cases, in which the fits had begun during the labour, 123 did not improve after the delivery, and in 50 of these the fits even increased in intensity. In the Clinique of Rostock, out of 63 cases there were only 18 in which the fits entirely ceased after delivery. Herman, in analysing 2,142 cases of eclampsia, shows that active treatment gives 1 to 2 per cent. better results than expectant treatment of the most diverse kind, but even here it must be remembered that operative measures were performed in hospitals under the most favourable conditions.

It has fallen to the writer's lot to see three cases of eclampsia successfully treated in the Rotunda Hospital during his short connection with that maternity, and the results impressed him so favourably that he determined to compile the statistics of the disease for the last 13 years—*i.e.*, since the introduction of morphine as the treatment. These statistics have not before been published, and the results are so remarkably good that they deserve to be widely known. Before dealing with the figures, however, a few words must be said as to the special method of treatment. In the year 1892 Sir William Smyly, at that time Master, on consideration of the high mortality from eclampsia during the previous years, introduced the treatment by heroic doses of morphine warmly recommended by

Veit. Then intervened a transitional period, 1892-1893, during which chloroform and chloral were added to morphine as the treatment. From this point onwards, Veit's treatment has been rigorously employed. Recently it has been amplified by the addition of new measures suggested by the theories of toxœmia.

The main object of treatment must be—first, the arrest of the fits; second, the elimination of the septic toxins of eclampsia from the system; third, the placing of the patient in the best possible position for the avoidance of pulmonary complications; and, fourth, the surveillance of the conditions of the heart, lungs, and kidneys, and the stimulation of these organs where necessary.

Induction of labour is never performed, nor is labour counted on in this treatment. In fact we know that every manipulation of the cervix reacts on the already supersensitive reflex, and precipitates the convulsions. Further, we know that such manipulations increase the risk of sepsis to which the eclamptic seems to have a peculiar liability. The only intervention permissible locally (and this only in very exceptional cases) is the application of forceps, the head being on the vulva.

We will not discuss here the prophylactic treatment which is only hygienic, and will at once take up the treatment of developed eclampsia. We will give the smallest details in the technique, for we believe them all to be essential and to have each their *raison d'être*. Firstly, half a grain of morphine is given hypodermically, and repeated, if necessary, in a dose of quarter of a grain every two hours, up to a maximum total of two grains in 24 hours. When possible, large quantities of water are given to drink; but where this practice is rendered impossible or dangerous by a semi- or a wholly-comatose condition, or by intractibility of the patient, the fluid is given by a

stomach tube. By this means the stomach is washed out with three to four pints of hot water. Half a pint of water is left in the stomach, and to this are added, still through the tube, two ounces of castor oil and three to four drops of croton oil.

Immediately after the above the patient is placed on the side, a long tube is introduced gradually *per anum*, first the lower part of the intestinal canal being filled with soapy water and flushed, and then, as the tube ascends, the higher part. This manipulation is persisted in as long as fæcal material is passed through the tube. About a pint of saline solution is left in the intestine.

The patient is now allowed to lie on her side, covered with warm blankets, and with poultices about her loins (to alleviate the congestion of the kidneys), special care being taken not to make the poultices too hot. We say this because we have seen several cases where the patient was injured by poultices which would have had no injurious effect on the skin of a healthy woman, but which are dangerous in the condition of lowered sensibility and vitality, a condition peculiar to the eclamptic.

Now we come to the third point (and one that is very important where the patient is comatose)—namely, the prevention of fluid or foreign bodies entering the trachea, and so causing pulmonary œdema and its sequences. For this purpose the patient must be kept continuously on her side; *absolutely* no nourishment must be given by the mouth, because the digestive function is in abeyance, and head must be turned to the side to facilitate the flow of mucous from the mouth.

Another very important point we wish to emphasise is that a gag must not be used; this statement is based on the known physiological fact that swallowing is impossible unless the jaws can be apposed.

The fourth point in the treatment is carried out by injections of digitalin when the pulse becomes feeble and rapid, and of atropine when the respiration becomes slow and sighing; and by saline infusions in very serious cases. Again, in cases of plethora, phlebotomy preceding the saline infusion may be of service.

We cannot lay too much stress on the importance of the washing out of the intestinal canal as thoroughly as possible. This part of the treatment aims at the increased elimination of the toxins by the intestinal tract during the temporary suspension of the filter-action of the kidneys.

It is also notable that constipation is a frequent precursor of eclampsia.

Many theorists blame morphine as dangerous to mother and child. We admit that it may have a deleterious effect on the respiration of the mother, but hold that it has no injurious effect on the maternal kidney action.

Again, as regards the child, it will be generally admitted that the administration of morphine cannot add, to any appreciable extent, to the immense danger already existing from the presence of the eclamptic poison.

Before giving a few figures to show the results of the morphine treatment in the Rotunda Hospital, we wish to emphasise one point—namely, the necessity of commencing the treatment in an early stage of the disease. The great majority of the deaths we have to mention are those of patients who came into the hospital moribund.

Let us give a few figures from various authors for comparison with those of the Rotunda Hospital. Herman gives a mortality of 20 per cent.; Williams, 20-25 per cent.; Edgar, 25-35 per cent. The mortality in the Rotunda Hospital during the years 1889 to 1892, before the introduction of Veit's treatment, was *35.3 per cent.* The present statistics show a mortality of *16.9 per cent.*, a

reduction of more than 50 per cent. This average is obtained from the occurrence of 12 deaths in 71 cases.

From the 1st of November, 1892, to the 1st of November, 1905—being 13 years—we find 70 cases of eclampsia occurring in 47,924 deliveries, being an verage of *0.146 per cent.*, or one case of eclampsia in *694*. This number we find to be only about half that of the Vienese Clinique —namely, *0.25 per cent.*

It follows from the above statistics that this morbid state is remarkably less frequent in Dublin than in other places.

### CONCLUSION.

From the numbers mentioned above we hold that we have sufficient grounds on which to base our argument in favour of the expectant treatment detailed in this paper, especially as in all cases of eclampsia this one method of treatment has been rigorously adopted.

We believe that in many cases the chief reason for more active treatment has been a want of pluck on the part of the medical attendant. We know well that it often requires a higher degree of courage to sit down and wait than to satisfy the family by a huge waste of energy.

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SIR ARTHUR MACAN said that the treatment by morphine was well known to him, even before Sir William Smyly was Master of the Rotunda. One reason why he did not adopt the morphine treatment was that he was satisfied with the results obtained by the treatment used while he was Master. This was a large turpentine enema, and chloroform to begin with, followed by chloral-hydrate per rectum, as much as 3ii in three or four hours. The sweating treatment was not much used, but since then he had used the hot air bath with very satisfactory results. He thought that the profession almost universally recognised that the termination of labour was a very important point in the treatment.

For the use of dilators, Cæsarean section, &c., all pointed to a belief in the efficacy of delivering the woman and a non-belief in the efficacy of the morphine treatment.

Dr. Horne said that to compare statistics of twenty-five years ago with statistics of the last ten or fifteen years was very erroneous, owing to the advent of Listerism, by which the mortality had been greatly lessened. He would not like it to be laid down that there was any routine treatment for eclampsia. Every case had to be treated on its merits and its condition on admission. He related a case which had occurred in the National Maternity Hospital this year, remarkable from the fact that it commenced in the fifth month. He had hoped to have learned the cause of the eclampsia, but it was passed over in the paper by saying that it was due to an "auto-intoxication." No special form of treatment could be relied on, and we must be prepared to use morphine, or, in certain cases, Cæsarean section, vaginal section, Bossi's dilator, &c.

Dr. Jellett said he would have liked Dr. de la Harpe to have gone into the question of the operative treatment of eclampsia. He was in thorough accord with Dr. Horne that no fixed line of treatment could be carried through in every case, nor did he believe that any one theory or set of causes would be found which could be laid down as the cause of eclampsia. One class of cases would be found to be due to one set of causes, &c., and treatment could then be classified accordingly. He said he was interested in the radical treatment of eclampsia, principally owing to the fact that he had been represented by Dr. Herman, in a paper read before the Medical Society of London, as having recommended such treatment at a time when he was distinctly opposed to it. Since then, in view of more modern statistics than those quoted by Dr. Herman, he was inclined to look on this treatment with more favour in serious cases. He quoted some of these statistics. He would not argue that radical treatment was the right one to adopt in all cases, but he did think that there were grounds for taking it into consideration and for considering whether, in cases that appeared to be severe, the radical treatment of emptying the uterus should not be adopted from the start.

Dr. Hastings Tweedy said that he considered it a pity

that one line of treatment could not be followed, as the cases were few in number. So long as we believe that no hard and fast line of treatment should be followed, we should be working in the dark. No useful statistics could be compiled, and one could not say what was the best line of treatment to adopt. He believed that the infrequency of eclampsia in Dublin was due to the habits of the people. In hot countries people accustomed themselves to very little fluid, but in Ireland the women drank a good deal of tea, &c. As to causation, he did not think that our knowledge of treatment would be brought much forward by knowing what the poison was. We had fair grounds for saying it was a toxæmia in the system. We saw lots of toxæmia, which just fell short of eclampsia, headaches, drowsiness, dulness, &c. He considered that the Master of any hospital should be very careful to include in his statistics every form of fit that came in, except epilepsy, as eclampsia.

Dr. Neill said he had seen a good number of cases of eclampsia in the Coombe Hospital. In one remarkable case the child was lying transverse, and as soon as the malposition was corrected the eclampsia ceased. The other cases were treated with morphine. Some of them were very bad, but all got well. Two or three minims of croton oil and vapour baths were given in every case.

Dr. Gibbon Fitzgibbon said that one point which had been largely ignored was the question of purgation. It was the treatment adopted in combination with the other palliative measures, and even in those cases where radical treatment was undertaken. In the morphine treatment a large amount of purgation was gone in for. The bowels and stomach were washed out, and sometimes up to seven minims of croton oil were given to clear out the bowels. Sinclair and Johnston reported a series of sixty-three cases occurring from 1847 to 1854. Among those three or four which were probably epileptic were included in the recoveries. There were thirteen deaths, but a certain number were certainly due to septicæmia. In those cases the treatment practised for the first five years was free venesection, and large enemata and purgatives were also given. In the last two years of that series venesection was continued, but the purgation was left out, and there was a considerably higher death-rate. He thought the

question of purgation was a good deal neglected, and deserved more attention than it received.

The President said that he desired to add his quota to the praise already bestowed on the paper to which they had just listened. It is plain, from a study of the old Masters' books in the Rotunda Hospital, that free venesection was the routine treatment of puerperal eclampsia for nearly a century after the opening of the hospital, and in many of the cases, even those admitted in coma, recovery took place. After the discovery of chloroform it also came into use, sometimes alone, sometimes combined with venesection. Dr. Atthill records an interesting case in which chloroform produced no effect in mitigating the seizures till blood was drawn, and subsequent recovery ensued. In one case of convulsions in a primipara far advanced in pregnancy, he injected chloral subcutaneously, and recovery followed. No method of rapid emptying of the uterus had ever commended itself to the speaker, though he is firmly convinced of the wisdom of expediting delivery by any gentle methods available, such as the use of forceps when the head is easily within reach. He had tried venesection, sometimes alone, sometimes followed by intravenous saline injection, but without success, possibly because the patients were beyond the reach of any treatment.

Dr. de la Harpe replied.

# TWO YEARS' (MAJOR) OPERATIVE GYNÆCOLOGY IN THE ROTUNDA HOSPITAL, DUBLIN—A RECORD OF PERSONAL EXPERIENCE.

By E. HASTINGS TWEEDY, F.R.C.P.I., Master.

[Read in the Section of Obstetrics, December 15, 1905.]

A brief review of work accomplished in any special hospital is seldom devoid of interest, and for this reason I desire to give a short *résumé* of our work in the gynæcological department of the Rotunda Hospital for the two years ending November, 1905, during which time I have held the Mastership.

The total number of major operations performed in this period amounts to 227; 15 of these were performed in my absence by my assistants, and include a successful Cæsarean section; as, however, I had no personal responsibility for these, they will not at present be considered.

The 211 cases that remain are made up as follows:—36 ovarian cystotomies (29 by the abdominal route and 7 by the vaginal); 30 operations for uterine myomata; 14 operations on pyosalpinx; 32 ventro-fixations; 18 vaginal fixations; 2 anterior colpotomies (undertaken for conditions not specified in this list); 4 removals of parovarian cysts; 8 hysterectomies for uterine cancer; 11 salpingotomies; 15 operations for tubal pregnancy; 3 ovarian resections; 9 operations for ventral hernia; 7 radical operations for procidentia; 1 operation for tubercular peritonitis; 2 hysterectomies for painfully retroverted uteri not amenable to other treatment; 2 removals of retro-peritoneal fibro-sarcomata; 1 operation for inversion of the uterus with prolapse; 1 for ovarian fibroid; 3 ovari-

otomies for dermoids; 7 abdominal myomectomies; 4 Cæsarean sections; and 1 enterostomy for congenital malformation of the large intestine.

It may be gathered from the above list that my definition of a major operation (as it affects the gynæcological specialist) is one in which the peritoneal cavity has been opened either through the vagina or through the abdominal wall, or else one in which a sub-mucous myoma is extracted by *morcellement.*

The number of deaths in this list was eight; of these, three occurred after hysterectomies undertaken for cancer, two after abdominal and one after vaginal hysterectomy. In the last of these cases death resulted from hypostatic pneumonia three weeks after the operation; the woman was old and enormously stout, weighing twenty-two stones, and was so helpless that it was impossible to keep her from rolling over on her back. In another death occurred on the third day after the radical abdominal operation suggested, and practised with so much success by Mackenrodt. To my mind this is the most extensive operation performed by the present-day surgeon, and the transverse incision, which is one of its essential features, extending almost from the anterior superior spine of one side to that of the other, impairs the integrity of the abdominal walls and increases shock to a degree incommensurate with its supposed advantages, viz.—a better view and a more extended field of operation.

Wertheim's brilliant results presented at the Leicester meeting of the British Medical Association encouraged me to attempt his operation. The patient died of sepsis on the second day, the origin of the infection not being far to seek. The cancer had converted the uterus into a mere shell and had involved the bladder to an extent not even guessed at before the operation. Whilst manipulating the uterus my

gloved forefinger passed through its walls in a most unexpected manner, and shortly after this calamity the bladder also was burst into while peeling it from the uterus. These untoward accidents could hardly have had any other than a septic ending. Our pathologist, Dr. Rowlette, by whom the autopsy was performed, informed me that a considerable amount of malignant disease had not been removed, and that this was particularly apparent in the bladder wall.

I do not feel that the eminent author of this operation has succeeded in establishing it as a permanent one. Neither in respect of its simplicity in performance nor its extensiveness can it be considered anything but a stepping stone to what we look forward to as the classical operation of the future.

It will be observed that hysterectomies performed for the removal of uterine cancer have been comparatively few and the results most disappointing. Operations were only undertaken in about fifty per cent. of the cases seen by me, and one woman is still alive in whom eighteen months ago I considered that the disease had advanced too far to justify operative interference. In another of my cancer patients the bladder was extensively involved, and was opened during the performance of a vaginal hysterectomy; a permanent fistula remained, and the patient died six months later from the recurrence of the disease. Recovery was uneventful in all the other hysterectomies for cancer, and these patients, together with the patient from whom an ovarian carcinoma was removed, are up to the present, I believe, free from disease.

One patient suffering from myomatous uterus died of sepsis, the result of a supra-vaginal operation; this case will be again referred to. Another arrived at the hospital in a dreadfully exhausted and septic condition, suffering from a large putrefying sub-mucous myoma. She died

under the anæsthetic just as I had completed the removal of the sloughing mass by *morcellement*. A patient was lost through the bursting of the sac of a pyosalpinx with consequent escape of septic matter into the abdomen during operation—by abdominal section. A very deplorable death resulted from an erroneous estimate of the depth in which a sub-mucous myoma was imbedded in the uterine wall; at the autopsy it was found that a hole existed in the uterus from which the myoma had been excavated. The last death should not fairly be considered an operative fatality; the wretched woman was admitted to our maternity hospital in labour, her vulva surrounded with horribly foul-smelling venereal sores. She was immediately placed in an isolation ward, and she delivered herself by natural efforts and without interference of any kind. Within twenty-four hours the most virulent form of sepsis had developed, with frequent and repeated rigors, temperature 104.4°, pulse 150. It was so obviously a case of inevitable death that I decided to give her the faint chance of an endeavour to stay the septic absorption by ligaturing the pelvic veins. On opening the abdomen the tubes and uterus were found bathed in pus on their outer aspect, and it became apparent that these structures should be removed. This was rapidly done, and the last stitch had been fastened in the abdomen when the patient's respirations became shallow, and death followed in a few minutes.

It will be observed that the two patients whose deaths are recorded as having occurred whilst under anæsthesia were both in a profoundly septic state, and they impress on us the special danger of anæsthesia in such cases.

The two retro-peritoneal lipo-fibro-sarcomata were enormous growths. In the first I removed a portion of the tumour as large as an Association football, but was unable

to pursue the operation further. The patient for some time was much relieved, but died three months later from recurrence without experiencing any pain. The second tumour I enucleated in its entirety; in doing so I tore the capsule of the right kidney, as it had been displaced by the growing tumour to the left hypochondrium; the renal structure was also torn. In spite of this the patient made an uneventful and apyrexial recovery, and she is at present in sound health.

Of over thirty-two ventro-fixations only thirteen were performed on patients who did not suffer from adhesions or whose displacements were not complicated with tubal or ovarian diseases; many of them were also sterile.

Exactly how far a gynæcologist should venture in the operative treatment of sterility has up to the present received no adequate expression of opinion. To conclude that all that can be done has been done for a woman when her uterus has been curetted and her cervix split reflects but slight credit on our art, nor is there much gained if, in addition, the uterus is replaced and kept in position by a pessary or by the shortening of the round ligaments (Alexander's operation).

In these cases it seems to me that ventro-fixation is the operation of election; the incision necessary for its performance enables one directly to inspect the tubes and ovaries. It is astonishing how often these structures are diseased without any indication of the fact being furnished by bi-manual examination, and my invariable custom has been to make a systematic attempt in every instance to improve the diseased condition. Adherent and twisted tubes are loosened, the fimbriated extremity is opened, if possible, and a fine probe is passed through its lumen to cause the passage to become patent. At times it is necessary to form a new os in the tube, and either to

hem round the raw edge in an endeavour to prevent its subsequent closure or to adopt a plan which I prefer—namely, to stitch the ovary into the mouth of the tube and so ensure the latter remaining open. I have been told that such an operation would lead to menstrual pain, but personally I have never had any reason to believe that this is so.

It is impossible to say definitely how far these operations succeed in effecting a cure; of a certainty pregnancy could not have taken place in many of the cases in which I considered them justifiable, and the direct inspection of the appendages seems an advance in the right direction.

The round ligaments are occasionally shortened, particularly in the case of young married women who suffer from replaceable retro-deviations. It is a neat and scientific procedure, and one that can be almost absolutely depended upon to accomplish its object—namely, the keeping the uterus in its normal position. In the light of my present experience, however, I cannot but believe that a pathological condition of tubes and ovaries is the commonest factor that makes for sterility. The apprehension of danger from childbirth following on ventro-fixation appears to have little foundation in fact, and I personally have never observed the least complication to ensue.

In performing vaginal fixations I have always employed the modern modification adopted by both Mackenrodt and Dührssen—namely, the closure of the vesico-uterine fold of peritoneum before the uterus is finally fastened by its fixation suture. Neither in ease of performance nor certainty of success does this compare with ventro-fixation, and the limitation of the field of vision makes it greatly inferior to the latter procedure in respect to the thorough exploration of the tubes and ovaries. The indications for its performance are with us, nevertheless, precise. It is

adopted in the case of a parous woman with retro-displacement complicated by rupture of the perineum and perhaps of the cervix, in whom an operation is undertaken for repair of these lesions.

We advise almost all patients who suffer in any way as the result of myoma formation to submit to operation. An exception to this rule is made in the instance of young unmarried or recently married women, where such operation would involve the loss of the uterus. The small sub-peritoneal tumours are removed by vaginal myomectomy, if of larger size than a hen's egg by abdominal myomectomy. In 24 cases the uterus had to be sacrificed, and in these, with very few exceptions, we preferred sub-total to panhysterectomy.

To revert to the fatal case of operation for myoma—a case in which the supra-vaginal method was adopted—septic infection arose as the result of an unfortunate accident, for which I am much to blame. The operation took place some two months after the date of my appointment to the hospital, at a time when experience was somewhat lacking as to the limitations of rubber gloves. Our hands had been severely burned by the prolonged action of antiseptics within the gloves. In this instance I discarded the use of antiseptics entirely, and during the progress of the operation my assistant, while fastening a clamp, caught my forefinger and tore the glove badly; a cursory glance did not reveal this fact, and it was not until a considerable time had elapsed that I became aware that my forefinger protruded through it. From the time of this calamity dates our present method of hand disinfection.

Two of my other operative fatalities had occurred prior to this one, and indeed within three weeks of my taking over the charge of the hospital. The peculiar circumstances of the position render it necessary for a new Master

to work at first amongst unaccustomed surroundings, with nurses, sisters, and assistants to whom his methods are entirely strange, and this placed me at such a great disadvantage that at times I am disposed to think that one, if not more, of these patients might have been saved had the operation been conducted under present conditions.

Our ventral hernias furnished two cases of extreme interest. In none of them was the original operation performed by me, nor has this accident happened so far as I am aware to any of my patients. On woman, on whom an operation had been performed in Egypt some years before, on the day of admission to our hospital burst her abdominal wall during a fit of coughing. The intestines lay on her abdomen and on her pubic hair for nearly an hour before relief could be obtained, and notwithstanding this her recovery was uneventful. The other case was that of an infant eighteen hours old, in whom the intestines protruded as a large mass from the umbilicus, covered only by a thin capsule of a greatly stretched out umbilical cord. This capsule was very firmly attached to the intestines, and during the process of separation the latter were badly torn. Fine silk sutures repaired the laceration, and the infant's subsequent progress towards health was all that could be desired.

We failed to find the aponeurotic covering of the recti muscles in one very fat and alcoholic patient, and in her case a relapse has taken place.

Amongst the abdominal operations there were five cases which showed some suppuration in the wound. In two the staphylococcus albus was found, in one the pneumococcus, in a fourth bacterium coli commune, whilst the germ in the fifth was not ascertained. In three of these the suppuration was slight and entirely superficial. In a fourth healing followed in a few days on the pulling out

of a small piece of the continuous silk suture that united the edges of the fascia. In the fifth case a small sinus remained six weeks after operation, and the patient, refusing further treatment, left the hospital.

This infection also had involved the fascial suture, and could have been perfectly easily cured by a procedure similar to that adopted in the other case.

Only four of our six Cæsarean sections (all of them successful) are included in this list. When due care is taken in selecting cases suitable for Cæsarean section this is amongst the easiest and safest of abdominal operations. In every instance the uterus was stitched by interrupted sutures of fine silk, and the abdominal wall closed in three layers by the same material. We never failed to notice the thickening process that continuously went on, and could be observed in the uterine incision during the time it was being sutured. This retraction force has no connection with uterine contractions and proceeds when the muscle is in a flabbily relaxed state. I have had occasion recently to perform Cæsarean section for the second time on one of my patients, and was interested to note that within an interval of eighteen months all traces of silk sutures had disappeared not only from the abdominal wall but from the uterus; the scar in the latter formed no adhesions, and indeed was discernible with difficulty. It was felt, however, as a slightly thickened portion of the uterus when it was grasped by one finger placed inside and the other outside that organ.

Having now dealt briefly with some of the more interesting cases, I shall pass to a consideration of our methods.

The hospital contains two small, well-lighted theatres suitable for the carrying out of the aseptic principles of surgery. In one all minor operations are performed, and in addition to these nearly all the vaginal colpotomy opera-

tions. For the latter the vulva is shaved and thoroughly washed by an assistant while the patient is under the anæsthetic.

Gamgee wool is held in a forceps, soaked in soap solution, and inserted into the vagina, and the latter is thoroughly scrubbed out, the action of the soap being aided by a douche; when this process is completed the vagina is well plugged with lumps of cotton soaked in biniodide of mercury solution. The patient's legs are placed in sterilised bags, and these are connected together by an abdominal apron, which enables the operator at any time to make a bimanual examination without touching the skin of the abdomen.

A piece of waterproof sheeting specially prepared to withstand repeated boilings is stitched to the perineum just above the anus, and serves admirably to protect the field of operation from contamination. Gloves have been worn almost without exception in all vaginal work for the past twelve months.

Theatre No. 2, as originally designed by Sir William Smyly, consisted of an exceedingly small room that might almost have been called a box. It was lighted by a northern light, and was entered from another room where all the disinfecting processes took place, and where, from a large elevated platform, the students viewed the operation through a plate glass screen. This screen, cemented into the lateral walls, and reaching from floor to ceiling, completely divided the rooms.

The extended use in surgery of the Trendelenburg position necessitated the turning of the patient's abdomen to the light and away from the view of the students. This resulted in much dissatisfaction, and continuous complaints reached me that it was impossible for lookers-on to follow the various steps of operations. For this amongst

other reasons, and acting on the suggestion of Sir William Smyly, I determined on its alteration. The screen has been pushed back so as to provide ample room in the theatre proper, and students now enter by a door other than that placed in the glass screen. They stand on raised platforms with their backs to the windows, and they obtain an exceptionally good view of the operation. Doors are bolted at the beginning of the operation, and late comers can as heretofore look through the screen.

One basin with hot and cold water connections worked by elbow levers is fixed in the theatre for the purposes of hand washing during operation; its waste-pipe passes through the wall of the theatre and opens into the air unconnected with any trap or sewer pipe.

All the sterilising apparatus is separated from the theatre proper by the screen, and in this screen is placed a small lift-up window to enable disinfected instruments to be handed into the theatre during an operation. Our city water supply is very pure, and we have not seen any necessity for its special sterilisation before employing it for hand washing. It is our invariable custom to fill the abdomen with saline solution at the termination of all abdominal sections, and to use a similar solution in which to soak "wipes" before they are placed within the abdomen. For these solutions the tap water is submitted to a special process of sterilisation which deserves a passing notice. The cold water is passed through a Pasteur's filter, and is discharged into a large sealed tank, from which a copper pipe, passing through the screen, conveys the filtered water to the theatre; a second pipe running parallel to this one carries water from a copper receptacle, beneath which a gas burner is placed, and the hot and cold taps for sterilised water lying side by side enable a nurse to obtain very readily water of any required tem-

perature. To filter the hot water by a Pasteur's apparatus would be an easy matter, but this has not seemed necessary.

Since January, 1904, we have worn gloves without intermission for all abdominal sections; their employment seems in no way to hamper, whilst the satisfaction of feeling that one cannot infect one's patient adds immensely to the confidence of the operator.

In order to avoid the injurious influence of mercurial antiseptics on the skin when imprisoned within gloves we have adopted the following plan with excellent results:—

After the usual thorough scrubbing with soap, nail brush and hot water, the hands are soaked in one in 1,000 solution of biniodide of mercury dissolved in 70 per cent. methylated spirit with 30 per cent. water. To remove this antiseptic from the skin the hands are well rinsed out in pure methylated spirit; some of this is also poured into the gloves after they have been emptied of the hot water in which they have been boiled. The methylated spirit acts as an efficient lubricant and permits the glove to be readily slipped on. The epithelium by its means is kept hard and dry, and is neither roughened nor burned by the prolonged action of alcohol. We have proved by numerous bacteriological examinations that the hands remain sterile even at the end of a two hours' operation; this being so, a needle puncture or even a slightly larger hole made in the gloves is a matter which no longer excites uneasiness, for we know that any fluid which may possibly escape from these will be sterile.

When time permits, the skin of the abdomen undergoes the usual process of preparation, and has a biniodide spirit pad of the solution above named placed over the site of operation.

We do not scrub with soap and water before the opera-

tion and while the patient is under the anæsthetic, for we believe that violent scrubbing with a nail brush at this time mechanically injures and devitalises the living epithelium, leaving it in a condition less likely to withstand the attacks of germs.

We rub the abdomen over with ether and then with biniodide solution, and finally paint the skin with tincture of iodine, or, better still, with saturated solution of picric acid in spirit. All these procedures have for their object the hardening of the epithelium and disinfection of its surface layer. It is of little consequence to us what germs may lurk within the deeper recesses of the skin if we can prevent them sweating to the surface, and this object can be attained with more or less success by following out the above procedure.

A Köcher's sheet is stitched to the abdomen to prevent its slipping from its proper position throughout the operation.

Repeated exposures of culture plates placed in different parts of the theatre have demonstrated the atmosphere singularly free from pathogenic organisms. They occurred in greatest number in the neighbourhood of the patient's chest, and obviously resulted from air-currents caused by the patient's, the anæsthetist's, and the operator's breath, together with that of his assistant's. To mitigate this evil we now place a screen on the chest of the patient to shut out the field of operation from her breath, as well as from that of the anæsthetist, whilst mouth bags are worn by operator and assistant.

Culture colonies increase in number the nearer the floor is approached, and the latter is, therefore, kept in a constantly damp condition to fix the dust and microbes that may fall on it.

Students are provided with white coats during their

stay in the theatre, but we have not made them wear mouth bags. It is evident, therefore, that in their breathing, coughing, and sneezing, and occasional talking, septic air currents to a considerable degree must arise. This being so, it has always appeared to me rational to dilute these germs by opening the theatre window. I know that such a view will obtain no general acceptance, but I personally have never been able to trace the remotest ill consequence to the course, and it certainly conduces to the comfort of those in the theatre.

If septic matter escape into the pelvis during the course of an operation, our operating table is immediately screwed into a position the reverse of the Trendelenburg position, with shoulders raised and pelvis lowered, and an assistant holds back the intestines while the infected area is douched out with copious quantities of saline solution. This position is very readily obtained in our excellent operating table of German manufacture. It is aseptic in design, can be elevated or lowered with the patient on it by a few turns of a handle, while another handle works the Trendelenburg and its reverse position in an absolutely perfect manner. The price of the table is, I believe, £13, and its efficiency is not excelled by that of any other of which I have had experience.

If there be reason to believe that septic matter has escaped into the pelvis we drain either with Keith's tube through the abdomen or with iodoform gauze through the vagina.

The head of the patient's bed is also kept raised on blocks for several days to confine infection to the pelvic region, as far as possible, and we think we have observed cases where this postural treatment succeeded in limiting the infected area.

At the completion of every abdominal section the cavity

is filled with saline solution before the abdomen is closed, as we believe that this lessens subsequent discomfort and thirst, provides a readier means for omentum and intestines to roll into normal position, and in the event of septic infection dilutes the poison and brings it into direct contact with a larger phagocytic area.

The abdomen is closed in three layers; peritoneum with No. 2 and aponeurosis with No. 4 silk, both boiled in corrosive sublimate solution. The skin wound is brought together with a sub-cuticular suture of silk-worm gut; the two extremities are passed through holes bored in a leaden plate, which latter is placed on the wound along its entire length; the ends of the ligature meet in the middle of the plate and are tied together.

In the event of the lower angle of the wound requiring drainage the leaden plate is an invaluable means of keeping the upper portion of the wound dry, and of preventing its contamination by sopping-wet dressings.

My main reasons for entering into such minute details of theatre management is that I may succeed in eliciting some expression of opinion on what may be deemed the practical requirements of aseptic surgery, as we at present understand the term. I cannot attribute any of my failures to faults in theatre construction, and this, too, I feel confident will be the verdict of every impartial reader of this paper. This being so, it does not seem too much to say that our theatre, simple in its construction, and inexpensive in its fittings, with its well-tiled floor, and its smooth cemented walls painted with Rippiline enamel, satisfies the requirements of our present aseptic knowledge.

If this conclusion be granted, and it should not be set aside on mere theoretical grounds, a crushing argument is furnished against the wasteful expenditure in theatre

construction and fittings so fashionable in the present day. Tens of thousands of pounds subscribed by the charitable public have been lavished in an effort to reach perfection. Architectural extravagance has been permitted a loose rein, and allowed to run riot, with results which have converted the simple workshop of the surgeon into a showroom which might well serve as a dazzling advertisement for a quack electrical specialist. Fortunate will it be for us if future generatons do not find just cause for censure in this extravagance.

I cannot conclude this paper without recording my sense of gratitude for the valuable help afforded me by my assistants, and more particularly by my nursing sister, Sister McIlroy, who has been associated with me from the first, and has devoted herself to the work with a whole-hearted enthusiasm.

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Dr. Jellett congratulated Dr. Tweedy, and said he agreed with him in his views on theatre expenditure. He also approved of having the windows open during operations. He thought that the sterilising apparatus should be removed to some distance from the theatre, as the air could, at present, be contaminated by it. He was inclined to think that face bags were not really necessary if the operator took proper care of his teeth. Discussing the technique of operating in cases of sterility, especially when caused by closure of ostia of tubes, he asked Dr. Tweedy if he had any reason to think that in a case where the tubal ostium had been glued down to the intestines there was any chance of making it patent again. He himself thought the chance small, and he thought the time might be better employed in removing the fimbriated extremities of the tubes where adhesions were most likely to form. He was much surprised to hear that Dr. Tweedy washed out the abdomen in every case, and asked what his views were on the subject of drainage.

Dr. Kidd asked what method of suturing was used in the cases of ventral hernia. He himself had used the three layer principle

with good results. In the case of sloughing myoma, which was removed by *morcellement*, and which ended fatally, would it not have been better to treat by removal of the entire organ? He thought that many cases of sterility were due to the condition of the male. He approved of wearing a mask, as a certain amount of sputum was kept out of the field of operation by it.

Dr. Horne agreed that the enormous expenditure incurred in making theatres was to be deprecated. He appreciated the strict asepsis of Dr. Tweedy, and suggested that the nurses also should wear masks. The fact of so many stitch abscesses having occurred showed that no matter what care was taken accidents would happen. He believed that cases of cancer frequently came for treatment when too late, owing to the fact that pain was a late symptom in the disease.

Dr. Purefoy said he had not made the use of rubber gloves a general practice. Many operators stated that their successes were not materially increased by their use, and the difficulty of manipulation was certainly increased. He asked what Dr. Tweedy considered the indications for operation in cases of recurring displacements. Many of these cases were attended with no symptoms. He utterly disbelieved in vaginal fixation, and thought that after Alexander's operation the ligaments frequently stretched again. He thought there was likely to be trouble after these fixation operations if the woman became pregnant, and supposing the ligaments were strong enough to hold.

Dr. Hastings Tweedy, in reply, said that he had enumerated all his bad cases. Those that remained recovered without causing anxiety. They suffered from neither excessive thirst, nor vomiting, nor flatulent distension, nor obstinate constipation. This he attributed in some part to filling the abdomen with saline. The patients would probably have recovered without the saline infusion, but he felt convinced that their convalescence would have been less uneventful. His series includes 100 consecutive abdominal sections without a death, but this is not a satisfactory record, so long as the majority of cancer cases seen are not submitted to operation. The submucous myoma removed by morcellation protruded through the vulva as a sloughing mass, and it was quite out of the question to suggest its removal by abdominal section.

# SEQUEL TO AN ATTACK OF ECLAMPSIA.

By J. SPENCER SHEILL, L.R.C.P. & S.I.;
Assistant Master, Coombe Maternity Hospital, Dublin.

[Read in the Section of Obstetrics, February 2, 1906.]

ECLAMPSIA is not such a rare complication of pregnancy that I would be warranted in bringing before your notice this evening details of yet another case were it not for the fact that this particular one presents some points of interest which are not common to the majority of instances of this obscure disease; and this must be my apology for occupying a portion of the time at the disposal of the Section to-night.

The patient came under my care in the Coombe Hospital in the month of March last, and details of her first trouble were published in the *British Medical Journal* of June 24, 1905, along with four other cases of induction of labour it was my good fortune to have within a short period of each other.

Let me read to you a portion of the reprint from that journal.

March 15, 1905.—K. B., aged twenty, primipara; five and a half months pregnant; suffering from eclampsia; seven seizures. Patient had left kidney removed three years previously for (?) abscess. On admission great œdema present; urine scanty, with much albumen. Morphine and the usual measures successfully adopted. The fœtal heart not being heard after careful auscultation, and as the fits had ceased, it was decided to empty the uterus by induction of labour.

March 16.—Os dilated by Hegar's dilators up to size 16, and three No. 10 bougies passed; vagina lightly plugged with iodo-

form gauze. Twenty-four hours later, as no pains ensued, the No. 10 bougies were removed, and after further dilatation of the os by Hegar's dilators three No. 12 bougies were introduced. This time the vagina was tightly plugged with gauze around the protruding ends of the bougies. About six hours later some irregular pains set in, and on the evening of the 18th—that is forty-eight hours after the commencement of induction—on removing the plug and bougies the os uteri was found to be about the size of a sixpence, and the cervix to be almost fully taken up.

Frommer's dilator was then cautiously inserted through the os, and although there had been no pains for over an hour previously, strong pains set in almost immediately after commencing dilatation; in fact, so powerful were the uterine contractions that I feared rupture of the membranes from pressure against the tips of the blades of the instrument. After dilating up to 4 cm. diameter the dilator was withdrawn. Pains now continued at five-minute intervals, and three hours and twenty minutes after the commencement of instrumental dilatation the child, which had apparently been dead for some time, was born.

The convalescence of this patient was rapid, and presented no items of interest, the œdema and albuminuria quickly disappearing.

You will observe from this that the sequel to this case, to which I desire to draw the attention of the Section, is of additional interest for the reason that the patient has but one kidney, and has had eclamptic seizures in a previous pregnancy.

The patient, Mrs. K. B., again placed herself under my care early in the month of July last, stating that she feared she might again be pregnant, as she had menstruated in a normal manner on the 7th April previous, but not since. Of course I had taken particular care, before discharging her from hospital in March, to warn her of the possible, not to say probable, result of any subsequent pregnancy—that such an event, on account of the loss of so important an organ as a kidney, might seriously im-

peril her own life and that of her offspring. It was with a wholesome fear of my predictions being verified that she approached me for advice the second time. On examination, I found her about two and a half months pregnant, apparently in excellent health, and with not a trace of albumen in the urine. While telling her of the state of affairs I warned her again of the possibilities, placed her on a total milk diet, and extracted from her a promise that no meat would pass her lips until after the confinement was over. She willingly agreed to carry out to the letter all my directions, which she heroically did, until the 4th of August, when this "*daughter of Eve*" was *tempted* to partake of a sausage for supper—and fell. The day following she visited me complaining of pain in the epigastrium, and examination showed that her urine contained more than a trace of albumen. After the usual treatment—purgatives, diuretics, rest, &c.—the albumen disappeared, only to return again, as shown by a specimen tested on the 5th of December. After a week's treatment the amount present decreased considerably, being but 1 per 1,000 by Esbach's tube, but later on, on the 19th December, a marked increase in the percentage of albumen was observed. On the 26th December, on being called to her home, I found her face and legs slightly œdematous, and the albuminuria still increasing. The patient was now within about four or five weeks of term. The fœtal heart was heard. On the 2nd of last month her urine, which had now become very scanty, boiled almost solid, while the patient appeared dull and stupid; further, the œdema was increasing. I shall not weary you, gentlemen, with details of the treatment, suffice it to know that under the influence of cathartics, hot packs, &c., she improved somewhat for a day or two. Then, on the 8th of January, the face and vulva becoming markedly œdematous, and as the pregnancy was within measurable distance of term, I decided to induce labour, believing that the onset of an eclamptic seizure was imminent. With the usual precautions, I dilated the os uteri digitally to about four centimetres diameter, and stripped the membranes from the lower uterine segment. The presentation was a vertex—first position. Fourteen hours after this procedure labour pains set in, and in another four an a half hours the patient delivered herself of a living male child.

The various stages of labour were easy and uneventful; the placenta was normal in appearance. This took place on the 9th of January, and at 8 15 o'clock—that is three and a half hours after the termination of the third stage—the patient had a *typical* eclamptic seizure. I adopted the morphin treatment and the usual therapeutic measures, successfully, and no further fit occurred. Day by day the condition of the patient improved, and as the urine and urea increased in quantity so did the contained albumen decrease until, on the 16th January, there was little more than a trace to be found. The infant was strong and healthy, though obviously small and premature. After carefully weighing in my mind the pros and cons, and as the mother's condition improved so rapidly, I decided, after three days, to allow her to suckle the baby, and I have not regretted it. Both are doing well to-day. It was interesting to hear the patient, when she had quite recovered, describing in her own words, and without being asked any leading questions, the onset of the eclamptic fit, how the figures of those in the room became indistinct, and a "veil of light" rose up before her eyes while she sank down and down, and finally fell asleep.

To my mind, Sir, out of this case two very important questions arise:—Firstly, with regard to the prophylactic treatment of eclampsia, are we to-day in the same pitiable condition as we were years ago—practically speaking, unable, with any degree of certainty, to prevent the onset of this dread "disease of theories," as I believe Williams has aptly called it, and must we wait until such a time as the pathologist can throw a steady light upon the ætiology of the affection, not the flickering light of the many existing theories of to-day, including yet another one quite recently propounded which, so far, have only served to make our confusion more confounded? And secondly, does it appear to those present that this patient, with her two attacks of eclampsia in one year, her one living child, and her one surviving kidney, would not best subserve her own interests, and those of her husband and offspring, by

submitting to have her tubes tied before the possibility of any future pregnancy arises?

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Dr. Purefoy said he believed that when our efforts to relieve the patient's condition were only partially successful we should take measures to empty the uterus, though eclampsia may come on before we have succeeded. He thought that in the second pregnancy of this patient he would have waited considerably longer before inducing labour. He would not render her sterile.

Dr. Horne preferred to have the ovaries removed, and mentioned two similar cases of his own experience. When a patient had eclampsia once, the question was, was she not likely to have recurrent eclampsia? The second pregnancy of this patient should have been prevented for this reason. He believed the kidneys were the primary cause of the disease.

Dr. Sheill said that a dead fœtus was a foreign body at best; and, therefore, to empty the uterus was the most natural thing to do. Noting eclampsia was imminent in the second pregnancy of this patient, he thought it safer to induce labour. Two lives in this case were in danger; but that of the mother was paramount. Both were saved. He would like to hear their opinion.—Should sterility be effected in a patient who is liable to attacks of eclampsia?

# A CASE OF HERNIA OF THE GRAVID UTERUS.

By ARTHUR N. HOLMES, M.B., B.Ch., B.A.O. Dubl. Univ.;
Assistant Master, Rotunda Hospital.

[Read in the Section of Obstetrics, April 6, 1906.]

The case I bring before you this evening is one of interest, not only on account of the conditions found in this particular case, but because similar cases are unlikely to be met with except at long intervals, owing to the advance in surgical technique.

The gravid uterus, we are told, may force its way into the sac of a previously existing hernia, whether ventral or inguinal, and give rise occasionally to grave difficulties, especially in the latter variety.

Another form of so-called hernia of the uterus is from time to time noticed in patients suffering from marked separation of the recti muscles, and is a condition which usually gives rise to little trouble. Again, the cicatrix of an abdominal incision may yield to the pressure exerted by a pregnant uterus, and thus produce the condition in question.

To this last variety the case, the history of which I now read, belongs:—

E. D., 11-para, aged forty years, was admitted to hospital on December 22, 1905. Upon examination an abrupt tumour was found springing from between the umbilicus and symphysis pubis, over which it hung, reaching more than half way down the front of the thighs. Roughly speaking it was the size of a six and a half month's uterus. On its surface there were several circular ulcerations of the skin, varying in size from sixpence to a five shilling piece, corresponding to where friction had occurred either from clothing or the inner surface of the thighs.

Just above the tumour in the middle line a cicatrix one and a half inches long, with two stitch marks, was observed. and upon enquiry we learned that an "operation" had been performed some eight years previously, shortly after which she had become pregnant, and had noticed a swelling in her abdomen. She was confined, however, without any difficulty arising. Becoming pregnant again she noticed the tumour, which had never quite disappeared, increased in size, and on its surface sores developed where her clothes rubbed, but again she was confined without trouble in Nov., 1903. She had observed that the "swelling" remained permanently, and much larger than after the first confinement. On palpation the tumour was found to be the uterus, and fœtal movement could be distinctly felt. The old scar in the abdomen had evidently given way, and the ring of the sac could be felt, but was too small to allow of reduction of the uterus. Furthermore, that organ was evidently firmly adherent to the covering wall of the sac. Some of these ulcers had almost eaten through the very thin integument covering the tumour, especially one which had extended to the peritoneum, and for a small area had eaten through that laying bare the uterine muscle. There was considerable discharge from the ulcer, so it was thought advisible to completely cover them with strapping. The patient delivered herself most unexpectedly, having had a few slight pains, but the placenta required manual removal on account of P.P.H., a procedure by no means easy owing to the position of the uterus, the cervix pointing almost directly backwards to the promontory. Her puerperium was uneventful, but in spite of all our endeavours to make her stay for further treatment she left hospital on the tenth day.

The child was alive, weighed three and a half pounds, and measured 16 inches, but despite its diminutive appearance, looked up to full term, which was in accordance with the menstrual history.

The mother having an insufficient supply of milk the infant was placed in the incubator and bottle-fed throughout. It left hospital looking very well. I have little doubt that its small size was attributable to a diminished blood supply consequent upon the abnormal position of the uterus and the constriction caused by the ring of the sac.

Dr. Horne said he had never seen a case of this kind. It was hard to conceive how the child was born through so great a constriction.

Dr. A. Holmes said the woman delivered herself, and had no pain. The tumour was about the size of a man's head. Dr. Purefoy told him that the woman is going about her work and is apparently well. The child died shortly afterwards of an attack of green diarrhœa.

# SOME REMARKS ON UTERINE SUSPENSION AND SHORTENING OF THE ROUND LIGAMENTS.

By JAMES S. ASHE, L.R.C.P. & S.I.;
Lecturer on Materia Medica, Ph.S.I.

[Read in the Section of Obstetrics, April 6, 1906.]

I HAVE chosen in this paper to deal with the cases of uterine suspension and shortening of the round ligaments which have come under my notice as clinical assistant to Sir William Smyly, at the Adelaide Hospital, to whom I am indebted for his courtesy in allowing me to comment on his cases.

Having made a diagnosis of retro-versio-flexion of the uterus, the question we have then to face is are we dealing with a case for palliative or radical treatment? For I firmly believe cases are operated upon which do not require operation, and cases which should be operated on are allowed to run too far or are left over altogether. I have looked up many authorities on this matter, and, in my opinion, Jellett states the case more concisely and pointedly than any of the others I have read. He says:—"Palliative treatment is at first indicated in all cases, as it may bring about the cure of the condition." Under this heading I would be inclined to group (1) the cases which are accidentally discovered, and, as they cause no apparent symptoms, require no operation; (2) the post-parturition cases which are due to atonic relaxation of the ligaments; and (3) the similar cases which are seen after a long illness, such as typhoid and other fevers. This class of case does very well with a pessary, tonic, and change of air.

There is a class of case which I have not yet seen

described which may be tried under this heading with palliative treatment, although it usually fails: the congenital or hysterostotic cases which are associated with enteroptosis of the abdominal organs generally, and which run in families—I have seen it in two sets of sisters; and again, those cases which I would describe as resilient uteri, which, having been put into position and a pessary inserted, keep returning to a malposition and probably mean an operation later on.

"Radical treatment is indicated" (and I still quote Jellett) "(1) When no pessary will be found which will keep the uterus in position." Those resilient and hysteroptotic cases I have mentioned. "(2) When the pessary causes discomfort and vaginitis." I have noticed a peculiar kind of vaginitis which goes with pessaries. The mucous membrane has a mottled appearance like a piece of Castile soap, the discharges thin and watery, and the sensation described as burning. This condition rapidly improves on taking out the pessary and putting in glycerine and ichthyol plugs for a few days. "(3) When the patient cannot pay the necessary periodical visits." These are chiefly cases which are going to some out-of-the-way place abroad; but also under this head may be grouped the poor, who frequent our dispensaries, and who cannot attend regularly, but prefer to undergo an operation and be done with treatment.

This classification does not include any indications as to the duration of the palliative treatment, which has to be left to the discretion of the gynæcologist and to the merits of each case.

Now as to the question of operation. Are we to do a shortening of the round ligaments or a suspension? The former, of course, seems to be the more natural procedure, and it seems to lessen the subsequent danger (?) if the

patient subsequently becomes pregnant as against suspension of the uterus by Howard Kelly's method. But from what I have seen I think suspension the more reliable, less difficult, and shorter operation, and I wish to state that from my anatomical and clinical knowledge no operator can definitely say, "I will shorten the round ligaments in this case and give a good prognosis." Why? Because the result will altogether depend on the condition of the round ligaments, which may be badly developed, or attenuated, and this can only be diagnosed when they are exposed. I have seen them normal on one side and attenuated on the other. On these grounds, therefore, Alexander's operation can never be a certainty, for if they are small and attenuated the ligaments will stretch and the retroversion will recur.

Perhaps the best rule would be in operating to keep an open mind, and make the usual abdominal median incision. Then, if the patient be young and likely to have a family, and if the round ligaments are well developed, give her the chance and shorten them in the manner I shall presently describe. If, on the other hand, the ligaments are not suitable, do a suspension.

I shall now comment on the cases which were operated on at the Adelaide Hospital last year.

In doing uterine suspension the incision is always the mesial one, and no muscles are cut. The transverse incision has been given up as limiting the space too much, for one can never be absolutely certain that a retroversion will be the only trouble found, and it hampers the operator when the space is limited. Sir William Smyly used silkworm gut as the suspensory ligature, two of which are usually passed transversely through the anterior and upper portion of the fundus, and the abdominal wound is closed by a slight modification of Kelly's method. Nine cases

were operated on in this way, and they all had an aseptic recovery. I have since seen six of them, and they are now in perfect health, as are the other three who wrote to me from the country in answer to my inquiries. This is certainly a record that cannot be beaten—100 per cent. cured. I may mention in passing that Howard Kelly's percentage was 99.

*Vaginal Hysteropexy.*—Three such operations were performed; in one the retroversion has recurred, another I have seen who is all right, and a third writes from the country to say she is in excellent health—66⅔ per cent. cured.

*Shortening of the Round Ligaments.*—This was done in all cases by the abdominal route, and Sir William Smyly combines Wylie's and Dudley's methods. Wylie seizes the ligaments in the middle and pulls them out, vivifying their opposing parts. He then passes three encircling cat-gut sutures. This is a mistake, I think, for two reasons. First, there are more ligatures than are necessary; secondly, there is danger of the stump sloughing; so that one good ligature which will perforate both ligaments is to be preferred.

Dudley's operation differs slightly from this; he vivifies the anterior surface of the uterus and stitches the ligaments with cat-gut. The method adopted at the Adelaide Hospital is a modification of both. Instead of pulling the ligaments out, as in the case of Dudley's operation, they are drawn in, but before this is done the ligaments are seized with a forceps as near the internal abdominal ring as possible and put well on the stretch, and again as near the cornu of the uterus as possible; when the forceps are brought together there is a loop of round ligament formed which can easily be drawn in and a perforating cat-gut ligature applied; the same is done on the other side. There are then the two free "knees" or "sheep shanked" liga-

ments to deal with, and the chief essential is done by ligaturing the "knees" together and then to the anterior and upper portion of the uterus. I hope you will understand my meaning from the diagrams on the board.

Of six such cases three have been quite satisfactory; one has again retroverted (and I may mention at the time of the operation it was remarked how attenuated the round ligaments were). The other two have cystic trouble. One of the cases cannot retain urine for more than thirty minutes at a time, and she finds this very trying, as she is in business. The other case is not so bad. I have examined the urine of both these patients, and am afraid the first case suffers from cystitis. This is not to be wondered at, as she had to have a catheter passed every day during her convalescence. The other case may prove interesting. The urinary trouble may be due to pressure of the pulled forward uterus on the bladder when it is filling, and we hope later on to have this case examined cystoscopically.

I would like to ask the Fellows of this Section whether they have noticed any after trouble in cases of shortening of the round ligaments. Also what their experiences are in cases which have afterwards become pregnant when abdominal suspension has been performed, as from what I know now as regards both the operations I would prefer to do a suspension, if such were required, rather than to shorten the round ligaments, the latter, in my opinion, being a longer, more difficult, and more tedious operation, and one which from published statistics does not give as good results as are obtained by suspension.

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Dr. Horne said that when the uterus was retroflexed after delivery it rarely recovered its position ; and it was a question

whether it should be left severely alone unless some symptom demanded interference. He had rarely, if ever, seen any untoward results follow the use of pessaries; and if such did occur, it was possible the pessaries had not been properly applied. Last month he removed a pessary that had been eighteen months in the vagina of a poor woman, without injury. When a pessary was used it was unnecessary to see the patient oftener than every three or four months. In the Alexander operation it was always difficult to find the ligaments, which were not in a healthy condition; besides shortening the round ligaments a pessary had to be used. He preferred the suspension method. The statistics brought forward by Dr. Ashe were rather scanty to be relied on.

Dr. Hastings Tweedy said it was not uncommon to observe retroflexions which did not give rise to symptoms. These were often congenital cases, and in such this backward position must be considered normal. It is almost unnecessary to state that these cases were best left untreated. Pessaries might well be compared to trusses; they had a narrow sphere of usefulness, but were by no means harmless. He did not think enough stress was laid on the mental ill-health likely to be engendered by the constant wearing of a pessary in the case of neurotic patients. He had personally seen nothing but good follow from the fixation of the uterus by operative measures. In danger such operations might well be compared to the danger following the extraction of a tooth, and he had yet to observe difficult parturition following as a result.

Sir Arthur Macan said it was obvious there were no serious symptoms connected with retroflexion of the uterus, whether congenital or acquired, when a woman could go about in that condition for twenty years without knowing that anything was amiss. There was a theory that it brought the ovaries into Douglas' pouch. He rather favoured the use of pessaries. A woman came to him who had worn a pessary for eight years. She had no vaginitis, and the pessary showed no signs of wear. If pessary treatment was beneficial, it was preferable to operation.

Dr. Ashe briefly replied.

# CLINICAL REPORT OF THE ROTUNDA HOSPITAL.

By E. HASTINGS TWEEDY, F.R.C.P.I., Master;

AND

ARTHUR HOLMES, M.B., B.Ch., B.A.O., Assistant Master.

[Read in the Section of Obstetrics, May 25, 1906.]

In presenting my report for the year 1904-5, it is with the utmost pleasure I announce the important structural addition to our hospital at present in process of erection. This addition—which was foreshadowed in my previous report—has become necessary because of the enormous increase in the number of patients who annually seek relief at our hands.

The problem presented to the Governors of the Hospital was a serious one, involving as it did either the curtailing of the usefulness of the charity by limiting the number of admissions, and by permitting the hospital to lack the essentials necessary for an institution which justly claims to be the premier maternity hospital in the British Empire, or to embark in extensive structural alterations. Between these alternatives the Governors did not hesitate, and the friends of the charity may rest assured that, as a result of their wise decision, the hospital will continue to maintain the high position it has hitherto occupied in the obstetrical world.

The site selected for the addition to the building has given rise in some quarters to a certain amount of uneasiness, lest by the necessary interference with the symmetrical lines of the old building its architectural appearance would be spoiled. In order to mitigate this as far

as possible the annex will have a frontage of granite, and will follow the curve of the old colonnade on whose site it will stand. A little consideration of the subject will show convincing reasons for the choice of this site.

Our Charter restricts us within narrow limits in respect to the ground on which we can build, and there is no other space available where an addition so large as this could be erected without gravely interfering with the light and ventilation of portions of the present hospital. Moreover, the removal of the old colonnade was much to be desired from a sanitary point of view. Its foundations have largely served for those of the new building—the construction of which will be still further cheapened by the utilisation of three separate walls, portions of the existing building and by the avoidance of a main staircase. Experts calculate that this saving in the initial cost has amounted to £1,000, and the gain in administrative economics will be still greater.

When completed it will increase the accommodation of the hospital by two large maternity wards, will supply us with ample isolation wards, with a special room for the delivery of infective patients, with a suitable disinfecting chamber, and will enable us to increase our nursing staff and supply them with adequate room. These, together with comfortable quarters for the lady students, are among the many advantages that will accrue to us.

It is within the recollection of all acquainted with the hospital that our maternity beds are of a very antiquated pattern, and date from a period when it was not an uncommon practice to place two patients with their babies in one bed. These beds have long been a source of anxiety to successive Masters. Their width precludes the possibility of placing cots beside them, and, as a consequence, the child has to be placed in bed with the mother. Many

disadvantages follow from this—amongst the least of which may be mentioned that the infants are irregularly fed, and occasionally suffer from infective enteritis, the result of the mother's dirty fingers or her pocket-handkerchief in contact with the child's mouth.

Of graver consequence must be recorded the sudden and mysterious deaths which are from time to time observed to occur in apparently healthy children. It is absolutely certain that in some instances these deaths are accidental, the result of overlying; but the fact that an undue proportion of them is found to occur among illegitimates compels the suspicion that accident is not the factor in every instance. For these, among other reasons, we have made a serious effort to make good our deficiencies in this respect.

I have to record our indebtedness to our Lady Superintendent, Miss Ramsden, for her painstaking and successful efforts to obtain a thoroughly satisfactory bedstead that we have adopted. It is strongly made, of a good appearance, and is possessed of a lever and rachet arrangement for elevating the head for purposes of more efficient lochial drainage. A wire cot for the infant is slung between uprights at its foot extremity, and a wire-woven shelf beneath this cot serves as a receptacle for the day and night quilt. It is also claimed by the makers that sagging is entirely prevented by their special arrangement of springs. This bed is thoroughly aseptic in construction, and strongly built. It can be procured for the sum of £6, inclusive of mattresses and bedding, from the firm of John and Joseph Taunton, Ltd., Shelbourne Road, Birmingham, the bedstead and cot alone costing but £3 10s. So far we only possess eight such beds, presented by different friends, the name of the donor appearing on a neat brass plate above each bed. I trust that my next

report will record that all the old bedsteads have been superseded by these new ones.

A further increase in the number of women delivered in the hospital is noted—the figures now amounting to 2,241 admissions and 1,904 deliveries. In my last report I commented on the surprising and steady increase in the number annually treated by us, and it is with pleasure I record the fact that, taking the intern and extern maternity together, the numbers this, together with last, year constitute a record for any similar period since the foundation of the hospital. The number of admissions were more evenly distributed throughout the months than during the former year, with the result that at no time did we suffer from the great overcrowding recorded in my last report. Partly owing to this, but chiefly, I believe, as a result of the introduction of better aseptic methods, our morbidity has fallen from 10.70 to 6.68 per cent., and our mortality from 13 cases to 6.

Our aseptic methods were fully set forth in my former report, and as nothing has been added to or taken from them they need not be again described. It is sufficient to say that they have worked with efficiency, and have justified their adoption and continuance in every detail.

In concluding my general remarks I have to express my indebtedness to the medical, surgical, pathological, and nursing staff for their painstaking and enthusiastic co-operation; and to Dr. Arthur Holmes, my senior assistant, I am particularly indebted for the admirable manner in which he has compiled the more important portions of this report.

EXTERN MATERNITY.

In the Extern Maternity 2,178 women were delivered, with a maternal mortality of eight.

There is a strict rule that all serious cases in the extern

maternity are to be advised to enter the hospital if by so doing they can in any way benefit by the greater resources of the institution. This rule does not apply to septic conditions, but even these are not infrequently admitted to the gynæcological hospital.

CAUSE OF DEATH.

| | |
|---|---|
| Septicæmia - - - | 4 |
| *Post-partum* hæmorrhage - | 2 |
| *Ante-partum* hæmorrhage - | 1 |
| Supposed embolism - - | 1 (pulmonary) |

In the cases of *post-partum* hæmorrhage both patients had lost a considerable quantity of blood before help from the hospital was sought.

The following are some interesting cases treated:—

Case I.—C. H., 2-para, aged twenty-five, in labour at seven and a half months; the head and foot presented and engaged in the brim; on the birth of the child it was found that the infant's ankle joint was dislocated as a result of strain and pressure; reduction was easy, and further progress uneventful.

Case II.—E. L., aged forty-four, 13-para, placenta prævia. During the process of combined podalic version the placenta became completely detached, and was expelled through the vagina. The child was rapidly extracted, but the patient, who had lost a considerable quantity of blood, did not respond to stimulus, and died shortly afterwards.

Case III.—M. H., fourteen days after the onset of typhoid fever, gave birth to a living child at full term. Both child and mother showed a positive Widal reaction, and the former suffered from markedly œdematous condition of the arms.

Case IV.—Difficulty having been experienced in the extraction of the aftercoming hydrocephalic head of a child, which presented by the breech, delivery was expedited by perforating between two cervical vertebræ and the drawing off the cerebro-spinal fluid by means of a catheter passed into the cranium through the spinal canal.

Case V.—An infant delivered in the extern maternity was sent into the hospital on the third day because of imperforate anus. A probe passed through the anal orifice to the extent of two inches. No bulging of the bowel could be felt at the roof of this cul-de-sac, and it was deemed advisable therefore to explore the condition by an abdominal section. A very atrophic condition of the large and small intestines was found extending from below Meckel's diverticulum. The large intestine in some portions had the calibre of a pen-handle, and contained a quantity of hard scybalæ. Near the sigmoid flexure the lumen ceased, the bowel being represented by a fibrous cord. An enterostomy was performed, and the child, though at first much relieved by the operation, died of inanition on the third day.

INTERN MATERNITY.

HYPEREMESIS GRAVIDARUM.

There were two cases of hyperemesis.

In the first—that of a primipara, 7½ pregnant—the type was severe, the vomiting continuing for nine days, sleeplessness and constipation being well marked. The treatment consisted of complete abstinence from food by mouth for three days, with rectal purgation and saline enemata. At the expiration of that time small quantities of peptonised whey and then of milk were administered and retained; ordinary hospital diet could be digested by the ninth day after admission, at which time she fell into labour, and was safely delivered of a macerated child. Recovery was uninterrupted.

In the second case—a multipara at term—obstinate constipation was also a marked symptom. Similar treatment was adopted, and the woman fell into labour in forty-eight hours, with a similar result as in the former case.

Auto-intoxication appears to us by far the most usual of the causes which account for this malady, and the treatment directed towards the dilution and excretion of this poison gives results which may well afford us satisfaction.

### ECLAMPSIA.

A most important communication on eclampsia appeared in the *Münchener medizinische Wochenschrift* for December 15, 1905, by W. Liepmann, First Assistant to Professor Bumm, of Berlin. The author makes it evident that a poison closely associated with the eclamptic condition is present in the placenta, and is probably formed in that structure. Further, that this poison is not contained in the blood or other secretions of the body, but is firmly fixed by the nerve tissues and liver cells.

In a paper read before this Section by me in 1893 I argued that this locking up of the poison in the solid tissues must occur, and it was absurd to suppose that any appreciable amount of it could be removed from the system by blood letting. It is a matter, therefore, of personal congratulation that convincing proof has now been adduced of this.

Professor Bumm claims that the rapid emptying of the uterus will prove successful in curing the eclampsia if the operation is undertaken soon after the first fit. His statistical tables are open to the grave objection that all cases are not included in his percentage of mortality. He has had but one death in a series of 71. We are not informed, however, whether these comprise all the cases seen or only those in which operative treatment is deemed suitable. The Professor's mortality before the employment of immediate delivery is given as 30 per cent.—a percentage extraordinarily high as compared with the experience of others—and these disastrous figures place his present statistics by contrast in a more favourable aspect. He is not alone in recording a long series of successes, nor is he the originator of accouchement forcé, for others have adopted a similar expedient with very dissimilar results.

It is strange, too, if all the patients in his recent series

were admitted at a period sufficiently early to make his treatment effective, for if they were not all recent cases, then an element of chance acknowledged by him has aided in procuring results which cannot be maintained.

At a recent meeting of this Section Dr. de la Harpe presented a report on a series of seventy-one eclamptic cases treated by morphin and the expectant method, with a mortality of 16.9 per cent.—statistics which include all patients seen in puerperal convulsions within recent years at the Rotunda Hospital.

Since my appointment to the hospital many points of detail in the expectant treatment which appear to me highly important have been added, and of twenty-five patients personally treated I have lost but two, both of which fatalities are fully described in this report. Were I inclined to eliminate any type of puerperal convulsion from this series I might be pardoned did I do so in respect to the first, if not in respect to both the fatalities. I strongly feel, however, that statistics of eclampsia should be arranged in a consecutive series, and should include all known forms of convulsions dependent on the pregnant state.

If this is not done it is easy to persuade ourselves that a certain number of fatal cases should be grouped under the heading "uræmia" rather than eclampsia. In the meantime, our total mortality of 8 per cent. is sufficiently encouraging to permit us to hold our hand until further developments.[a]

Case I.—See Maternal Mortality Table.

Case II.—E. A., 2-para, aged twenty-six, admitted January 3rd, 9 30 p.m., with a history of four fits, which had begun five hours before admission. Half a grain of morphin had already been given, and the patient was deeply comatose. Labour

[a] Since this was written another successful recovery from eclampsia treated by this method is to be recorded.

started in two hours, and three more fits occurred before 12 20 a.m. A further quarter grain of morphin was administered, and the stomach was washed out by means of a stomach pump, enemas administered, and saline injections given beneath the breast and per rectum. She delivered herself of a macerated fœtus at 11 a.m. No more fits occurred, but the patient remained unconscious for thirty-six hours after the birth of the child. Further recovery was uneventful.

Case III.—B. B., primipara, aged twenty-eight, admitted, with marked œdema of the legs, on January 7th. At 12 15 a.m. on the 8th a fit occurred just as labour had started, and another followed in half an hour. Castor oil, saline injections, stomach lavage, and morphin injections constituted the treatment adopted; up to 3 10 p.m. fits continued at intervals, and at this hour forceps were applied to the head, which pressed on the perinæum, a living child being extracted. One and a half grains of morphin had in all been administered up to the completion of the third stage, and at 5 30 p.m. the respirations had fallen to seven per minute, showing a condition of morphin intoxication; this called for artificial respiration, hypodermics of atropine, and saline infusions. Ten fits took place before the birth of the child, one during the third stage, and one eleven hours after delivery. In nine hours from this time the patient regained consciousness, and albuminuria, which was present to a marked degree on admission, had not entirely disappeared when the patient left the hospital.

Case IV.—M. S., primipara, aged twenty, delivered, January 8th, of a macerated and premature fœtus. Six hours after delivery three fits occurred in rapid succession. Treatment as above relieved the symptoms, and no more convulsions occurred for forty-eight hours. At the expiration of that time a relapse took place, three fits following, these again yielding to treatment. From this time the patient's convalescence was uninterrupted, but albumen was present in her urine on the day of her departure from hospital.

Case V.—A. G., primipara, aged twenty-nine, with a history of five fits before admission, which were followed by three more within half an hour of her entering the hospital. Despite the administration of three-quarter grain of morphin, given in divided

doses, six further fits followed. Labour set in the following morning, and the patient, in a condition of deep coma, was delivered in one hour of a five and a half months' fœtus. No further convulsions occurred, and the urine, which was very scanty and loaded with albumen, rapidly became normal in amount, and contained only a trace of albumen on the ninth day after delivery, when the patient left the hospital.

CASE VI.—M. B., primipara, aged twenty-seven, delivery normal in every way, as also was the puerperium until the fourth day. Eclampsia then started, the urine was highly albuminous, and diminished in quantity. Nine fits occurred in all. The patient was discharged on the ninth day cured.

CASE VII.—M. B., 9-para, aged forty-two, normally delivered, May 26th. She had a history of mania following her last delivery. On the fourth day of the puerperium the patient complained of headache and dimness of vision, her pulse rose to 112°, and this was followed by the occurrence of three fits. In forty-eight hours the patient had a relapse, and seven convulsive seizures were included in this attack. Pulse and temperature again rose, and they did not fall to normal until the twenty-third day after delivery, when the patient was discharged cured. Albuminuria was present throughout the eclamptic seizure.

CASE VIII.—See Maternal Mortality.

CASE IX.—L. M., primipara, aged twenty-two, admitted, because of eclampsia, from the extern maternity. Three fits had occurred, and the patient was well advanced in labour. Forceps were applied, and constitutional treatment adopted; there was no recurrence of convulsions, and the albumen present in the urine on the first day had totally disappeared at the period of her leaving the hospital.

CASE X.—M. N., 5-para, aged thirty-eight, admitted from the extern maternity with a history of seven fits. Labour had started, and natural delivery of twin birth took place six hours later. Fits did not recur for sixty hours, at the end of which time she experienced six convulsive seizures, followed by twenty-four hours of deep coma, and after this considerable mental

derangement for several days. Convalescence was still further retarded by an attack of pneumonia, but this, together with the œdema and albuminuria, both prominent conditions of her disease, had entirely disappeared before the patient left the hospital on the thirteenth day.

Case XI.—M. W., 2-para, aged twenty-three, admitted, September 18th, with a history of from twelve to sixteen fits during the twelve hours previous to admission. The next morning the patient was very maniacal, and sleeplessnes, which was a marked symptom, was overcome by bromides and chloral in large doses. On the following day the mental condition had improved, and the woman, falling into labour, was easily delivered of a macerated fœtus; her urine was highly albuminous, and Dr. F. C. Crawley, who kindly examined her eyes for us, reported that marked neuro-retinitis was present. The patient left the hospital on the twelfth day free from albuminuria.

Case XII.—M. P., primipara, aged twenty-seven, admitted in a deeply comatose condition, with pregnancy advanced to the thirtieth week. She had five fits before admission, the urine was scanty and loaded with albumen. The usual treatment was adopted, and no further fits took place, consciousness returning in eight hours. She left the hospital on the seventh day with but a trace of albuminuria, and was delivered of a living child at her own home six weeks subsequently, no further trouble being experienced.

### HYDRAMNIOS.

Of our eight patients suffering from hydramnios, five showed œdema of the lower extremities due to pressure, and one of these had symptoms of collapse shortly after rupture of the membranes. Cardiac and pulmonary distress were present in another case, and necessitated the induction of labour by puncture of the membranes. The patient delivered herself of stillborn twins, the sac of one of which contained fourteen pints of fluid. Living twins were born in another case. In the remaining case version was necessitated because of the transverse presentation

with prolapse of an arm, and a living child was born by natural efforts.

ABORTIONS AND PREMATURE DELIVERIES.

Thirty-nine cases were treated during the year, and call for no special comment.

In all cases where the os was sufficiently open the ovum was removed by the finger, and in the cases in which the introduction of a finger was impossible a flushing curette was used to empty the uterus.

It is interesting to note the marked decrease in the number of these cases treated as compared with the last year's and many preceding.

ACCIDENTAL HÆMORRHAGE.

There were eight cases of this complication during the year. In two the loss of blood was not great, and no special treatment was called for. In another good labour pains were in progress, and the application of a tight binder controlled the bleeding.

In four the vagina was plugged after the Rotunda method with happy results, and in one forceps accomplished delivery. In this case the child lay in occipito-posterior position with the head low down.

PLACENTA PRÆVIA.

Of this condition only three cases are recorded, and in all the placenta was felt by vaginal examination. Hæmorrhage was considerable in every instance. In two bi-polar version was undertaken, the cases being afterwards left to nature. Both children were born dead. In the third the woman entered hospital because of a sudden and considerable flooding. She was kept under close observation in the hospital for a few days, when labour started, and she delivered herself of a living child without further bleeding.

ATRESIA OF THE VAGINA.

The cervix could not be felt in this case, because of a sharp ridge formed by a contracted vagina in its central portion. The orifice of this contraction admitted only a fine probe. It was gradually dilated by means of mechanical dilators, and gave rise to no further trouble.

PROLAPSE OF THE FUNIS.

The cord was found prolapsed in eleven cases. In one the condition was associated with hydramnios and macerated fœtus. In three others the cords were not pulsating when first felt, and the children were born dead by natural efforts, the vertex presenting in these four cases. In a fifth the breech presented, and the cord was successfully replaced, a living child being born. Success attended combined bi-polar version in two other cases, the os admitting but three fingers in each instance at the period when the prolapse was discovered. One of these cases appears in the table of contracted pelves (*vide* M. C.). In three more the prolapse was discovered during the second stage of labour, and all were delivered of living children—two by forceps and the others by natural efforts. The last recorded prolapse occurred in the case of a woman in whom Cæsarean section was afterwards performed.

RUPTURE OF THE UTERUS.

One case of this occurred in the extern maternity. The patient was admitted to hospital, and ultimately delivered. For details, *vide* Case II., Maternal Mortality.

SPONTANEOUS INVERSION OF THE UTERUS.

The case of this very rare accident arose during the labour of a primipara, who was delivered of a full term child by natural efforts. The patient was attended by our Assistant Master, Dr. Holmes, who found the uterus well contracted

at the termination of delivery. Following the advice of Sir Arthur Macan, the separation of the placenta was left entirely to nature, and the hand taken from the fundus, while, at the same time, a close watch was instituted to see that no bleeding arose. In twenty minutes the patient cried out as though in labour, and she declared the pains were as bad as when the child was being born. The placenta and fundus protruded through the vulva, and a hollow was felt over the pubes. A gloved hand was at once passed into the vagina, and the placenta, adherent by a firm attachment to the inverted fundus, was removed.

While this was being done another pain started, and the organ turned completely inside out, its fundal extremity being forced through the vulva.

No difficulty was experienced in its reduction. Neither collapse nor excessive loss of blood followed, and the pain was immediately relieved by the reduction. Furthermore, the puerperium was uneventful and apyretic.

### *POST-PARTUM* HÆMORRHAGE.

Nineteen cases of this condition are recorded—a diminution of ten as compared with last year. In one the type was purely atonic, and necessitated plugging with iodoform gauze. In eight the hæmorrhage was associated with retained placenta, all of which required manual removal. Hot uterine douches were successfully employed in all the other cases.

### HÆMATOMA VULVÆ.

The one example of this has already been referred to under the heading Mania.

### APPLICATION OF FORCEPS.

There were eighty-two cases which called for the application of forceps. In the majority the indication was

undue delay in the second stage. For details, *vide* Table VIII.

INDUCTION OF PREMATURE LABOUR.

Premature labour was induced three times—twice for pelvic contraction and once for tubercular disease of the larynx.

Case I.—S. F., 2-para, aged thirty-three, admitted with a flattened rachitic pelvis with a conjugata vera of 7 c. She stated that her former baby had been delivered by perforation in the country. On November 1st bougies were introduced between the membranes and the uterus, calculation having demonstrated the woman to be in her thirty-third week of pregnancy. On the following day the bougies were changed and fresh ones inserted, but these also failed to induce labour at the end of another twenty-four hours; two ounces of sterilized glycerine was then injected between the membranes and the uterus; labour started some hours after this, and lasted twenty-two hours, when she was delivered of a living child weighing three pounds.

Case II.—E. C., 2-para, aged forty-one, admitted during the thirty-seventh week of pregnancy, with a history of pregnancy having been induced on four previous occasions. The presentation was transverse, and the os admitted three fingers. By means of a Frommer's dilator the cervix was opened to a diameter of 10 cms. This did not induce labour to start, and at the end of twenty-four hours a Champetier de Ribes' bag was inserted, and a traction weight of five pounds exerted on it for twelve hours. It was then removed, and bougies were placed in the uterus; in seven hours labour had started, and when the membranes ruptured a foot presented. This was seized, and a living child, weighing seven and three-quarter pounds, was quickly delivered. The conjugata vera measured 8 cms.

Case III.—E. O'K., 5-para, aged forty-one, four months pregnant. She had developed laryngeal phthisis shortly after the last menstrual period. Dr. M'Evoy, of Blackrock, who brought the patient to me, had previously consulted Dr. R. H.

Woods concerning her throat trouble. The latter gave it as his opinion that her chance of cure would be enhanced were her uterus emptied, and both Dr. McEvoy and I concurred in this view. The cervix was opened with Bossi's dilator, and the uterus rapidly emptied of its contents, the cavity being subsequently plugged with iodoform gauze to stay further hæmorrhage. A hectic temperature, present on admission, continued until the ninth day, and then fell to normal. The patient left the hospital on the twelfth day apparently much relieved.

Two points of interest arise in connection with this case:—(1) As to the justification of the operation, the propriety of which for my part I had no doubt of; (2) as to the best means of emptying the uterus in a condition such as this, where shock and loss of blood are factors to be avoided as far as possible. The operation here adopted no longer commends itself to me.

### PODALIC VERSION.

Podalic version was undertaken ten times—twice for placenta prævia, twice for prolapse of the cord, and three times for flattened pelvis. In another case hydramnios complicated a cross-birth whilst the remaining cases will for no further comment.

### CÆSAREAN SECTION.

This operation was performed four times during the year, and in one case was undertaken for the second time. All the patients recovered without complication of any sort.

CASE I.—A. O'R., primipara, a rachitic dwarf, measuring four feet three inches in height. Membranes had ruptured before admission, but the woman was not in labour. Labour began the following morning, and one hour afterwards the operation was performed; the placenta was situate in front, and was cut through before extraction. The patient nursed her baby from the third day. (Case 2, Table VII.)

Case II.—M. F., primipara, aged twenty-six, a rachitic dwarf, and unmarried, had been eighteen hours in labour before admission. The fœtal heart was distinctly heard, and steps were taken for the performance of immediate Cæsarean section. The child was dead, but the mother made an uninterrupted recovery. (Case 5, Table VII.)

Case III.—J. B., aged thirty-four, 4-para, was admitted with a history of three previous pregnancies terminated by craniotomy. She believed herself to be within a fortnight of her confinement, and this view was confirmed from physical examination by us. Measurements obtained by Skutsch's pelvimeter showed marked contraction (*vide* Case 3, Table VII). Labour did not set in till six weeks after this (a circumstance which, according to Pinard, is not uncommonly met with in contracted pelves, and he accounts for this prolongation of gestation by the fact that the presenting part of the fœtus cannot sufficiently press on the pelvic nerves and ganglia of the cervix easily to excite the labour cycle). The uterus was markedly inert throughout the first fifteen hours of labour, the head showed no tendency to engage, and as a further complication the membranes ruptured and the cord prolapsed. She left the hospital on the thirty-ninth day well, and with a healthy child.

Case IV.—A. P., 2-para, aged twenty-three, admitted during my absence from hospital on vacation. Her former child had been delivered by Cæsarean section in June, 1900, by Dr. Purefoy, then Master. The woman was up to full term, and, this being so, it was decided to operate without waiting for labour to start. My assistant, Dr. FitzGibbon, with the help of Dr. Purefoy, operated. The uterus was rotated to the left in such a manner as to cause the right tube to present, and an adhesion had formed between the uterine and abdominal scars. The child was extracted by opening through the site of the former incision; the internal os was tightly closed, and the subsequent recovery without any complication shows that it is in no way necessary for success that labour should have started. (Case 10, Table VII.)

### MANUAL REMOVAL OF THE PLACENTA.

It was necessary to remove the placenta in twenty-six

cases—a decrease of ten as compared with last year. In only two was interference due to irregular contractions of the uterus. As above mentioned, under *post-partum* hæmorrhage, eight cases required the operation because of hæmorrhage, and in the remaining sixteen the placenta was firmly adherent to the uterus.

Gloves were worn in this and in all our other obstetrical operations, and it is interesting to note the lessened degree of morbidity which followed on this practice.

### HYPOSTATIC PNEUMONIA AND PNEUMONIA.

CASE I.—S. F., 6-para, aged thirty-three, sent up from the North of Ireland because of marked œdema and albuminuria. She delivered herself safely of a living child shortly after admission, and her puerperium until the eighth day was uneventful. Her diet consisted during this time of milk, milk puddings, and bread and butter. Pulse and temperature suddenly rose to 100 respectively, and respiration became very troubled. For three days following this she became continuously worse, a marked condition of œdema of the lungs developed, and no hope was entertained as to her recovery. Trinitrine tabloids, amyl-nitrite, and oxygen inhalations were constantly administered with strychnine and other stimulants. Our Consulting Physician, Dr. James Little, was assiduous in his attendance throughout her illness, and we have no doubt that her subsequent recovery was entirely due to his skilful treatment.

CASE II.—*Vide* Maternal Mortality, Case 5.

### MANIA.

Mania developed in two of our patients. In one *delirium tremens* developed on the second evening after child-birth, and occasioned us much anxiety and trouble until the sixth day. She inflicted some injury to her vulva on the fifth day during a violent paroxysm, as a result of which a hæmatoma formed, which did not, however, materially interfere with her convalescence, and she left the hospital on the eleventh day. In the case of the

other woman acute mania started on the sixth day after labour, and on the fifteenth day she had to be removed to an asylum, the disease showing no tendency to improve.

### MORBIDITY.

Another year's experience of our method of estimating morbidity has proved most satisfactory, and our charts, which have been designed for more readily recording this morbidity, have been extensively inquired for and copied by many other maternities.

The dark lines on these temperature charts point to the upper limit of normal temperature, and the blank space between the charts is for the recording of a pulse above 140. Temperature and pulse must together rise above the black lines, and remain above them for three consecutive bi-daily takings, or, in other words, for a period of twenty-four hours, before we record the case in our books as morbid. By this we eliminate the transitory and unimportant exacerbations of temperature and pulse which are not infrequently seen in cases to which it would be utterly misleading to apply the term "morbid." Furthermore, we do not take into account the irregularities of pulse or temperature so frequently observed within twenty-four hours of the period following delivery. That this is a better index to the condition of our patient than the plan which formerly obtained is proved by the fact that when our hospital was in an unhealthy state during the year 1903-4 a considerably larger percentage of morbidity was recorded by this than by the older method. Last year, on the other hand, the hospital was singularly free from serious infection, and this is again made apparent by the new records showing a lower rate of morbidity than that which the former would have shown.

It must, however, be confessed that this double index

of morbidity is open to the objection that accuracy in recording a pulse-rate is not always obtainable on the part of probationer nurses, and we occasionally see a temperature above the normal line and a pulse record just below it, perhaps, recorded at 89 beats per minute. For purposes of diagnosis we do not hesitate to consider such a case as one in which the double limit has been exceeded, but it may escape, nevertheless, being recorded as morbid, and it is obvious that this will occur more frequently in maternities where looser supervision is exercised.

The advantages as proved by a year and a half's practical experience far outweigh this more or less theoretical disadvantage, and I had the honour to urge its general adoption at the Leicester meeting of the British Medical Association. As a consequence of this, a representative committee was appointed, who carefully considered the question in all its aspects. As a result of their deliberations, they have decided to recommend to the profession at large a simple, but necessarily arbitrary index of morbidity for statistical purposes alone, and have not in any way bound themselves to the suggestion that this standard includes in its scope all puerperal diseases. They suggest that a temperature which reaches 100° on more than one of the bi-daily takings from the end of the first to the end of the eighth day should be classed as morbid, and that all deaths should be so classed irrespective of a temperature rise.

A proportion of the committee considered that abortion cases were particularly prone to develop morbidity, and as some institutions did not admit these cases into their wards, it has been suggested that they should be classified in a separate table, and this suggestion has also been adopted.

These proposals, if acted on, will prove, I believe, of in-

estimable benefit. They will enable maternity hospitals to compare results from statistics computed on similar lines, and will arm us with precise data, so that we can enforce the adoption in practice of means which ensure the smallest percentage of morbidity.

In estimating our morbidity by the above method we find that our percentage works out at 8.77, viz.—167 in 1,904 cases.

It is, further, of interest to note in how many of these operative interference had been undertaken.

| | CASE | MORBID |
|---|---|---|
| Uterus plugged for P. P. H. .. | 1 | 1 |
| Forceps cases .. .. .. | 83 | 11 |
| Version .. .. .. | 10 | 2 |
| Manual removal of placenta .. | 26 | 6 |
| Breech deliveries .. .. | 69 | 6 |
| Abortions .. .. .. | 39 | 2 |
| Plugging for accidental hæmorrhage | 4 | 1 |
| | 232 | 29* |

MATERNAL MORTALITY.

The first of our six deaths occurred on the 14th November, 1904, from a condition which we tentatively term eclampsia, though it differed in many clinical and pathological points from that disease as we commonly meet it.

Case I.—M. C., 6-para, aged thirty-four, was admitted on the morning of the 11th in labour; she was deeply jaundiced and œdematous, with marked albuminuria; her aspect was dull and lethargic. The case was diagnosed as uræmia; milk and water in large quantities to drink and saline purgatives were prescribed. At 8 30 p.m. of the same day she delivered herself naturally of a stillborn, but fully developed, child; she slept well that night, but on the following morning complained of headache and dimness of vision. The œdema and jaundice increased. The bowels were moved by means of a large enema, and a saline enema was

* Total Morbidity being 12 %.

injected and retained as desired. A slight fit took place at 2 p.m., and was followed by a severe one at 5 p.m., with a third of less severity in ten minutes time. At the end of the first fit half a grain of morphin was injected, and another quarter at the termination of the third and last fit. The patient never recovered consciousness, and died in profound coma on the night of the 14th, just forty-five hours after the last convulsion. Her temperature rose to 103°, with pulse of 120, immediately after the first fit, and remained at these points to the end. Her urine was high coloured, considerably diminished in quantity and loaded with albumen.

Professor O'Sullivan has kindly supplied us with the following report of the pathological findings of the liver, and they present, in his opinion, a unique condition:—

"The liver presented an appearance which, for the extent of tissue involved, is quite without a parallel in the literature of the subject as far as I have been able to find.

"The organ was somewhat larger than normal; the capsule smooth and transparent. On the surface there showed through the capsule large irregular clay-coloured areas, each surrounded by a wavy red zone a few millimetres in thickness. The remainder of the surface was stained of a deep green colour, the outlines of the lobules showing distinctly, the darker green being in the centre.

"On section the same appearances were to be seen—clay-coloured homogeneous areas, each surrounded by its red zone, coalescing and forming larger areas, while the remaining liver tissue showed the deep green bile staining. Fully two-thirds of the liver tissue had undergone transformation into this clay-coloured substance.

"The gall-bladder was much thickened and retracted; the mucous membrane hypertrophic and thrown into folds. At the extreme upper end a cholesterine stone was impacted, blocking up the orifice of the cystic duct. The stone was of the size of a small hazel nut.

"Microscopic sections showed, in the clay-coloured areas, the liver tissue in a typical condition of coagulation necrosis, the nuclei refusing to stain, while the cell protoplasm took on a

diffuse dirty staining. In the red peripheral zones the capillaries were filled with red cells. The tissue of Glisson's capsule was less affected, most of the connective tissue nuclei staining well.

"Sections stained with Weigert's fibrin stain, and counter-stained with carmine, presented a very striking appearance. All through the necrotic portions, and at their margins, just outside the red zones, the walls of middle sized and smaller branches of the hepatic artery were converted into a substance which retained the fibrin stain strongly. On following up the arteries the degeneration ceased as they got larger, at first becoming confined to the cells of the muscular coat, then appearing only in a few of the muscle cells, the rest being healthy, and finally disappearing altogether. Everywhere there could be seen, close to the smaller branches of the artery, but at a little distance from it, a bunch of capillaries whose walls had undergone the same degeneration, and retained the fibrin stain. The liver cells between these capillaries were sometimes healthy, sometimes necrotic. Neither the branches of the portal nor hepatic veins, nor the capillaries elsewhere through the liver, showed any tendency to this degeneration, even in the most completely necrosed portions they did not retain the fibrin stain. There was nowhere any destruction of liver tissue, such as occurs in acute yellow atrophy. The necrotic cells everywhere retained their form and arrangement.

"Osmic acid sections showed a few granules and globules of fat scattered through the section, but no evidence of any extensive fatty change.

"Sections from a number of different parts of the organ were stained by various methods for bacteria, but none were found.

"We have then, as far as the pathological anatomy of the liver goes, a case of extensive anæmic infarction, accompanied (and possibly caused) by an equally extensive hyaline or fibrinoid degeneration of the smaller branches of the hepatic artery, a certain system of capillaries, probably those in relation to the artery, being similarly degenerated.

"The jaundiced condition of the liver and the general jaundice must be regarded, I think, as due to the enormous blocking of the biliary circulation in the infarcted portions, rather than to

the biliary calculus, as the calculus apparently left the hepatic ducts and common bile duct free."

CASE II.—M. K., 6-para, aged thirty-six, admitted, May 25th, 1905, from the extern maternity, suffering from a ruptured uterus and undelivered. Labour had started at 8 a.m. on the 24th, membranes ruptured an hour later, and pains continued strong till 10 30 a.m., when they ceased altogether.

Her friends becoming uneasy about her condition sent to the hospital for help, and she was admitted that night at 11 30, a correct diagnosis of her condition having previously been made by the clinical clerk. Forceps were at once applied to the head fixed in the brim, in occipito-posterior position, with os almost fully dilated, the body of the fœtus at the same time lying free in the abdominal cavity. Delivery was easily accomplished, and a rent was discovered involving the cervix and posterior wall of the vagina. The placenta, which lay free in the abdomen, was removed by hand. The patient's condition did not seem to warrant operation, and the rent was plugged with iodoform gauze. Death followed in four hours.

This case furnishes another example of the rupture which some years ago I pointed out as being the kind most commonly met with in this country. Our experience in this differs from that of other countries, where contracted pelves furnish the most common source of rupture.

The origin of these utero-vaginal tears I believe to be closely associated with cervical cicatrices, the result of former deliveries, with a consequent incapacity for full dilatation of the cervix.

It is not uncommon to find the cervix of the primipara incapable of a sufficient dilatation to permit the passage of the fœtus through it, and rupture of the uterus must consequently take place before the birth of the child. In such cases as these it is a fortunate matter that the cervix is the weakest portion of the uterus, and, therefore, the part which gives way. On the other hand, in multiparæ

it may be found tough and exceedingly unyielding on account of deposit of fibrous tissue—such a condition predisposing to the accident described.

In the discussion provoked by the reading of my paper on this subject, the statement was made that a primipara's cervix would never tear provided labour was natural and the membranes were not prematurely ruptured. I have met many cases that prove the incorrectness of this view, and I select the following from amongst them:—

L. M., attended by me, in labour for the first time after five years sterility. She was delivered of premature twins, of such diminutive size that the ring worn on my little finger passed easily over their hands. The delivery was easy, and the membranes only ruptured a short time before birth. She suffered greatly from menstrual pain for years before this pregnancy, and I have recently operated on her for the repair of a bi-lateral laceration of the cervix.

Case III.—M. K., 9-para, aged thirty-five, admitted, May 25th, 7 45 p.m., with a history of five fits. A sixth took place immediately she reached the hospital, and two more followed this at intervals of half an hour; a hypodermic of morphin—half grain—was administered as soon as possible, and the stomach washed out in the usual manner. Purgatives were poured through the stomach tube, and these, aided by copious saline enemata, had the desired effect. The patient was deeply comatose, and labour did not start until four hours after admission. Four hours later she delivered herself of a full term, stillborn child.

I saw her before I retired to bed, and then considered her condition in every way favourable. She showed distinct signs of regaining consciousness, urine was being secreted, and her pulse was strong. It was therefore with feelings akin to dismay that I learned on going my rounds in the morning that the patient had died suddenly at 8 25 a.m., and that my Assistant had only just time to be called and observe her condition before the fatal termination.

No further eclamptic seizures had taken place, and all who

saw her concur in stating that she became deeply cyanosed with swollen tongue, and died in apparently a choking condition.

I much regret that there was not time to call me to see this patient, for it is just possible that oxygen inhalations, combined with vigorous efforts at artificial respiration, might have warded off the fatal attack. It will be noted that death took place five and a quarter hours after delivery, no fit having occurred for eleven and a quarter hours. The great cyanosis reminds one forcibly of the fatal case reported by Professor Bumm, which he terms "eclampsia without fits."

CASE IV.—S. O'K., primipara, admitted 30th June, 1905, in premature labour at seven months. Her labia and thighs were covered with horribly foul-smelling and septic venereal sores. She delivered herself naturally and without any interference in a special isolation ward, to which she was conveyed immediately on admission. A temperature of 104°, with pulse of 150, developed, and a very acute form of sepsis supervened, with repeated rigors, but persistent temperature. On the seventh day it was apparent that death was inevitable, and I decided to give her the faint chance of ligaturing the pelvic veins. On opening the abdomen, however, the uterus and tubes were found bathed in pus on their peritoneal aspect, and nothing remained but to remove these organs; this was rapidly accomplished, but the patient ceased to breathe just as the operation was finished.

CASE V.—Pneumonia. A. D., 9-para, aged twenty-eight, admitted September 18th, 1905. She had been delivered of a dead child in a cab on her way to hospital. Her condition was wretched, and there was a history of great alcoholic excess. The right lung was completely solid, and she died on the ninth day after admission.

CASE VI.—M. C., primipara, aged thirty-eight, admitted October 19th, 1905, with membranes ruptured, os about half dilated, and a fœtal leg protruding through the vulva. She stated that this condition had existed for three hours, an arm had also passed through the cervix, but there were no labour pains.

I issued distinct orders that the case should be left to nature so long as pulse and temperature showed no signs of rising. A mistake in transmitting this order occurred, and my Assistant

Master formed the impression that it was my desire that he should deliver immediately. In this he experienced great difficulty. The operation took two hours to complete, in chief part owing to the tight closure of the cervix round the neck of the child. A macerated fœtus was eventually extracted, and a complete rupture of the perinæum stitched. Temperature and pulse rose on the second day, and though the former fell after a few days to normal, the latter became continuously quicker, and she died on the sixth day after delivery of very acute sepsis.

The autopsy showed acute peritonitis, with pus, in the abdominal cavity. The uterus was studded with sloughing myomata, and both tubes were converted into pus sacs. I may add that all operative manipulations were conducted with gloved hands, and for this reason I think that possibly the septic condition may have been contracted before admission to hospital.

### INFANTILE CONDITIONS.

Congenital umbilical hernia was present in an infant whose parents were deaf and dumb. The intestines protruded as a large mass, and were only separated from the air by a thin coating of the greatly stretched out umbilical cord.

An abdominal section was performed three hours after the birth, and the intestines were found so firmly adherent to the sac that a somewhat severe tear of the bowel occurred during their separation. This was stitched in the usual manner, and the intestines returned to the abdomen, not without considerable difficulty. The child left the hospital in perfect health one month after the operation.

TABLE No. I.—*Maternity Department.*

| — | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total deliveries - | 144 | 132 | 153 | 146 | 169 | 159 | 181 | 147 | 161 | 154 | 172 | 147 | 1,865 |
| Total abortions - - | 2 | 1 | 4 | 1 | — | 7 | 5 | 2 | 5 | 2 | 4 | 6 | 39 |
| Not in labour - | 19 | 26 | 19 | 31 | 29 | 28 | 39 | 35 | 33 | 24 | 27 | 27 | 337 |
| Total | 165 | 159 | 176 | 178 | 198 | 194 | 225 | 184 | 199 | 180 | 203 | 180 | 2,241 |

TABLE No. II.—*Out-Patients.*

| | |
|---|---|
| Number of first attendances - - - | 4,580 |
| ,, repeated ,, - - - | 6,480 |
| Special Dispensaries - - - - - | 1,965 |
| Total - - - - | 13,025 |

TABLE No. III.—*Showing Nature and Number of Cases in Extern Maternity.*

| | | | |
|---|---|---|---|
| Total deliveries - - | 2,178 | Hæmorrhage—con.— | |
| Abortions - - - | 272 | Unavoidable - - | 11 |
| Presentations— | | *Post-partum* - - | 20 |
| Face - - | 6 | ,, ,, secondary | 1 |
| Face to Pubis - - | 21 | Operations— | |
| Brow - - | 1 | Forceps - - | 32 |
| Breech and Footling - | 69 | Versions - - | 16 |
| Transverse and Obliquæ | 9 | Manual removal of Placenta - - | 34 |
| Compound - - | 5 | Catheterisation for Hydrocephaly - - | 1 |
| Corpore conduplicato - | 1 | Maternal mortality - | 8 |
| Twins - - | 25 | Infantile conditions— | |
| Prolapse of Funis - - | 6 | Congenital intestinal obstruction - | 1 |
| Hydramnios - - | 3 | Spina bifida - - | 1 |
| Mania - - | 1 | Hydrocephalus - | 3 |
| Phlegmasia - - | 2 | Anencephalus - - | 1 |
| Complete laceration of Perinæum - - | 3 | Meningocele - - | 1 |
| Hæmorrhage— | | Talipes - - | 3 |
| Accidental - - | 2 | | |

Table No. IV.—*Showing Nature and Number of Cases Treated in Intern Maternity.*

| | | | |
|---|---|---|---|
| Total admissions | 2,241 | Pneumonia | 2 |
| „ deliveries | 1,904 | Eclampsia | 12 |
| Abortions | 39 | Mania | 2 |
| Primiparæ | 700 | Puerperal ulcer | 8 |
| Hyperemesis | 2 | Mastitis | 2 |
| Hydramnios | 8 | Spontaneous inversion of uterus | 1 |
| Presentations— | | Rupture of uterus | 1 |
| Face | 2 | Hæmatoma vulvæ | 1 |
| Face to Pubis | 12 | Morbidity (100.8°-T. and over) | 134 |
| Brow | 2 | Morbidity (Rotunda Estimation) | 127 |
| Breech and Footling | 51 | Mortality, maternal | 6 |
| Transverse and Oblique | 6 | Mortality, infantile— | |
| Compound | 2 | Died in Hospital | 34 |
| Twins | 32 | Premature | 18 |
| Prolapse of Funis | 11 | Recent | 39 |
| Hæmorrhage— | | Macerated | 52 |
| Accidental | 8 | Infantile conditions— | |
| Unavoidable | 3 | Anencephalus | 3 |
| *Post-partum* | 19 | Hydrocephalus | 1 |
| Secondary | — | Spina bifida | 2 |
| Lacerated Perinæum, incomplete | 455 | Congenital umbilical hernia | 1 |
| Lacerated Perinæum, complete | 4 | Subcuticular Ecchymosis | 1 |
| Myoma of uterus | 6 | Ophthalmia | 2 |
| Deformed pelves | 12 | Talipes | 4 |
| Atresia of vagina | 1 | Deformed hands | 1 |
| Operations— | | „ feet | 1 |
| Induction of labour | 3 | Icterus | 8 |
| Version | 10 | Cleft palate | 2 |
| Forceps | 82 | Mastitis | 2 |
| Cæsarean section | 4 | Fœtus papyraceous | 1 |
| Manual removal of placenta | 26 | Born in asphyxia pallida | 7 |

Table No. V.—*Accidental Hæmorrhage.*

| Name | Age and Para | Date | Variety | Treatment | Result to Child | Remarks |
|---|---|---|---|---|---|---|
| M. McA. | 34, XI. | 1904 Nov. 15 | Concealed | None | Dead | 3½ lbs. of clots followed birth of child. |
| M. B. | 41, XI. | „ 25 | Mixed | Plugged | Dead; macerated | Concealed at first, then became external four hours before delivery. Premature child. |

TABLE No. V.—*Continued.*

| Name | Age and Para | Date | Variety | Treatment | Result to Child | Remarks |
|---|---|---|---|---|---|---|
| A. K. | 18, I. | 1904 Dec. 26 | Mixed | None | Alive | In labour. Clots before and after birth. |
| C. P. | 28, II. | 1905 Jan. 21 | External | Plugged | ,, | In labour. |
| K. S. | 35, X. | Mar. 24 | ,, | ,, | ,, | Not in labour. Labour was not induced by plugging Kept in bed as hæmorrhage recurred when she got up. Delivered herself April 8th. |
| C. O'N. | 30, VII. | Apl. 29 | ,, | Tight binder | ,, | Hot vaginal douche. In labour. |
| B. C. | 22, I. | Sept. 6 | ,, | Plugged | Dead; macerated | In labour. |
| E. G. | 24, I. | Nov. 14 | ,, | Forceps | Alive | In labour. Hæmorrhage started during 2nd stage occipito-posterior. *Vide* "Forceps." |

TABLE No. VI.—*Placenta Prævia.*

| Name | Age and Para | Variety | Period | Result to Child | Presentation | Remarks |
|---|---|---|---|---|---|---|
| A. P. | 28, IV. | Lateral | Term | D. | Vertex | Bleeding a fortnight irregularly; version; delivery in one hour. |
| P. C. | 38, V. | ,, | ,, | A. | ,, | Placenta could be felt, but after admission there was no hæmorrhage; delivery in five hours. |
| N. U. | 28, V. | ,, | 8 months | D. | ,, | Version; delivery in three hours. |

TABLE No. VII.—*Cases of Contracted Pelvis.*

| Name | Age | Para | Pelvic Measurements | | | | | Mode of Delivery | Result to Child | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | C. V. | Trans. | Ext. C. | I.-C. | I.-S. | | | |
| S. F. | 33 | II. | 7 | 11½ | 20 | 27 | 28 | Spontaneous | Alive | Labour induced. |
| A. O'R. | 29 | I. | 5¼ | 11 | 17 | 24¾ | 25 | Cæsarean Section | Alive | |
| J. B. | 34 | IV. | 6⅜ | 10⅜ | — | 25½ | 25⅛ | Cæsarean Section | Alive | |
| M. T. | 28 | II. | 7¼ | 10 | 17 | 24 | 24 | Forceps | Dead | |
| M. F. | 26 | I. | 6 | — | 15¼ | 27 | 27 | Cæsarean Section | Dead | |
| E. C. | 41 | XI | 8 | 11¼ | 18 | 28 | 30 | Spontaneous | Alive | Labour induced. |
| A. O'C. | 36 | I. | 8⅛ | — | 18½ | 28 | 28 | Forceps | Alive | Head above brim. |
| E. S. | 36 | IV. | 9¾ | — | 18 | 27 | 24 | Version | Alive | |
| E. F. | 33 | III. | 8½ | 10 | 17½ | 27½ | 25 | Forceps | Alive | Other deliveries, induced labour. This was full term. |
| A. P. | 23 | II. | 7⅞ | — | 16½ | 28½ | 27 | Cæsarean Section | Alive | Cæsarean Section, second time. |
| B. M. | 33 | I. | 7¼ | 11⅞ | 17 | 27 | 25 | Version | Dead | Face presentation. |
| M. C. | 36 | II. | 9 | — | — | — | — | Version | Alive | Prolapse of cord. |

TABLE No. VIII.—*Application of Forceps.*

| Indication | No. | Dead Children | Remarks |
|---|---|---|---|
| Delay in second stage, with danger to mother or child | 66 | 3 | One of the children was macerated. |
| Prolapse of cord - | 2 | — | |
| Contracted pelvis - | 3 | 1 | *Vide* contracted pelvis table, M. T. |
| Occipito-posterior - | 7 | 2 | *Vide* ruptured uterus, one case. In another, patient 48 hours in labour. Os size of sixpence, dilated by Frommer. |
| Eclampsia - - | 2 | — | Os fully dilated. Head low down. |
| Cardiac and pulmonary disease | 1 | — | Patient in great distress. In second stage; pulse 120. Respirations 65. Cyanosis and orthopnœa. |
| Fibroid uterus - - | 1 | — | Large fibroid on right side of lower uterine segment. Pains very weak. |
| Total - - | 82 | 6 | |

SUB-TABLE A.—*Showing No. of Pregnancy.*

| | |
|---|---|
| I.-para - - - - | 63 |
| II.-para - - - - | 5 |
| III.-para - - - - | 5 |
| IV.-para - - - - | 1 |
| V.-para and over - - | 8 |
| Total - | 82 |

SUB-TABLE B.—*Showing Ages of Patients.*

| | |
|---|---|
| 17-25 - - | 21 |
| 26-30 - - | 33 |
| 31-35 - - | 15 |
| 36 and over - | 13 |
| Total - | 82 |

Table No. IX. A.—*Morbidity* 100.8° *and over.*

| Temperature | Nov. | Dec. | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100.8° to 101.2° | 1 | 6 | 4 | 3 | 3 | 1 | 1 | 2 | 7 | 3 | 2 | 3 | 36 |
| 101.2° to 102.2° | 6 | 2 | 3 | 5 | 2 | 8 | 5 | – | 3 | 2 | 7 | 6 | 49 |
| 102.2° to 104° | 3 | 6 | 4 | 1 | 4 | 2 | 4 | 3 | 2 | 6 | 3 | 6 | 44 |
| 104° and over | | – | – | 2 | – | – | – | 1 | – | – | 1 | 1 | 5 |
| Total | 10 | 14 | 11 | 11 | 9 | 11 | 10 | 6 | 12 | 11 | 13 | 16 | 134 |
| Percentage | | | | | | | | | | | | | 7.03 |

Table No. IX. B.—*Temperature and Pulse over* 99° *and* 90.

| | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temp. and Pulse over 99° and 90 | 10 | 12 | 8 | 6 | 13 | 10 | 12 | 16 | 8 | 11 | 11 | 10 | 127 |
| Percentage | | | | | | | | | | | | | 6.67 |

Table No. IX. C.—*Comparison of Morbidities.*

| | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. of cases in which both Morbidities existed | 7 | 10 | 6 | 4 | 5 | 5 | 8 | 5 | 2 | 7 | 9 | 10 | 78 |
| No. of cases of 100.8° T. only | 3 | 4 | 5 | 7 | 4 | 6 | 2 | 1 | 10 | 4 | 4 | 6 | 56 |
| No. of cases of 99° T. and 90 P. only | 3 | 2 | 2 | 2 | 8 | 5 | 4 | 11 | 6 | 4 | 2 | — | 49 |

For standard of Morbidity, as recommended by the British Medical Association, see general remarks on Morbidity.

TABLE No. IX. D.—*Day of occurrence of Temperature* 100.8° *and over.*

| Day | Nov. | Dec. | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1st | — | 1 | — | — | 1 | 1 | 2 | — | 2 | 1 | 2 | 3 | 13 |
| 2nd | 1 | 2 | — | — | 4 | 1 | — | 1 | 2 | 2 | 1 | 2 | 16 |
| 3rd | 1 | 4 | 2 | — | — | 3 | — | 3 | 4 | 3 | 4 | 3 | 27 |
| 4th | 1 | — | 4 | 5 | 1 | 4 | 1 | — | 3 | 2 | 2 | 3 | 26 |
| 5th | 1 | 1 | 1 | 1 | 2 | — | 2 | — | — | 1 | 1 | 2 | 12 |
| 6th | 1 | 3 | — | — | 1 | 1 | 2 | 1 | — | — | 1 | — | 10 |
| 7th | 1 | 1 | 2 | 3 | — | 1 | — | 1 | — | — | 1 | 2 | 12 |
| 8th | 3 | — | 1 | — | — | — | 3 | — | 1 | 1 | — | — | 9 |
| 9th | 1 | — | 1 | — | — | — | — | — | — | 1 | 1 | — | 4 |
| 10th, &c. | — | 2 | — | 2 | — | — | — | — | — | — | — | 1 | 5 |
| Total | 10 | 14 | 11 | 11 | 9 | 11 | 10 | 6 | 12 | 11 | 13 | 16 | 134 |

TABLE No. IX. E.—*Day of occurrence of Temperature and Pulse, over* 99° *and* 90.

| Day | Nov. | Dec. | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1st | — | 1 | — | — | 1 | 2 | 2 | 4 | 2 | — | 2 | 1 | 15 |
| 2nd | 4 | 4 | 1 | — | 1 | — | — | 2 | 1 | 3 | 3 | 3 | 22 |
| 3rd | | 3 | — | 3 | 6 | 4 | — | 4 | 2 | 2 | 4 | 2 | 30 |
| 4th | 2 | 1 | 2 | — | 1 | 3 | 3 | 4 | 2 | 2 | — | 1 | 21 |
| 5th | 1 | — | 2 | — | 2 | — | 1 | — | 1 | 2 | — | — | 9 |
| 6th | 1 | 1 | 1 | — | 1 | — | 1 | 1 | — | 2 | 2 | — | 10 |
| 7th | — | 1 | 2 | 1 | 1 | 1 | 2 | — | — | — | — | 2 | 10 |
| 8th | 1 | — | — | 1 | — | — | 3 | 1 | — | — | — | 1 | 7 |
| 9th | 1 | — | — | — | — | — | — | — | — | — | — | — | 1 |
| 10th, &c. | — | 1 | — | 1 | — | — | — | — | — | — | — | — | 2 |
| Total | 10 | 12 | 8 | 6 | 13 | 10 | 12 | 16 | 8 | 11 | 11 | 10 | 127 |

Table No. IX. F.—*Causes of Morbidity other than Uterine*

| | |
|---|---|
| Breast abscesses ... ... ... | 2 |
| ,, inflamed ... ... ... | 3 |
| Bronchitis ... ... ... ... | 1 |
| Constipation ... ... ... ... | 10 |
| Eclampsia ... ... ... ... | 2 |
| Influenza ... ... ... ... | 6 |
| Phthisis ... ... ... ... | 1 |
| Pneumonia ... ... ... ... | 1 |
| Renal disease ... ... ... ... | 2 |
| Puerperal ulcer ... ... ... | 5 |
| Impetigo ... ... .. ... | 2 |
| Phlegmasia alba dolens ... ... | 1 |
| Cystitis ... ... ... ... | 1 |
| Venous thrombosis ... ... ... | 2 |
| Gum-boil and swelled face ... ... | 1 |
| Total ... | 40 |

Table No. X.—*Maternal Mortality.*

| Name | Admitted | Delivered | Died | Cause of death | Notes |
|---|---|---|---|---|---|
| M. C. | Nov. 11 | Nov. 11 | Nov. 14 | Eclampsia | *Post-partum* |
| M. K. | May 24 | May 25 | May 25 | Rupture of uterus | Rent plugged |
| M. K. | May 25 | May 26 | May 26 | Eclampsia | — |
| S. O'K. | June 30 | June 30 | July 8 | Septicæmia | Pan. Hysterectomy |
| A. D. | Sept. 18 | Sept. 18 | Sept. 26 | Pneumonia | — |
| M. C. | Oct. 19 | Oct. 20 | Oct. 27 | Septicæmia | — |

Dr. Alfred Smith criticised the methods of stimating the standard of morbidity adopted in the British Islands, and was delighted that Dr. Tweedy had initiated a movement towards uniformity. Without accepting in full the proposed method he thought it should be given a fair trial. Considering the general instruction in Dr. Tweedy's Report that "we do not take into account the irregularities of pulse or temperature so frequently

observed within twenty-four hours of the period following delivery," some explanation was necessary as to Table IX., which included fifteen cases of morbidity as occurring on the first day. He hoped this did not indicate a weak spot in their method of standardisation.

Dr. H. Jellett said that the report showed better results than previous years. He thought its form, however, might be improved, and in this connection he had brought down the report of the Clinic Baudelocque in Paris, which report, as would be seen, was divided into five distinct headings as follows:—(1) Abortions; (2) Labours; (3) Operations; (4) Morbidity; (5) Mortality. He suggested this form of report should be adopted in future. He considered that if the term "eclampsia" was to be made as wide in its meaning as Dr. Tweedy wished, it would be also necessary to widen our ideas on treatment, and not to rest content in the belief that the morphin treatment was suitable for every form of convulsion occurring in pregnant or puerperal women. Dr. Tweedy's effort to formulate a proper standard of morbidity deserved the thanks of the Academy. As to the case of the patient who died of septic infection resulting from venereal sores, he did not consider that mere abstention from examination, &c., was sufficient. Active treatment should be also adopted, and in such cases he would advise to place the patient under an anæsthetic, and treat the sores with pure formalin.

Dr. Stritch stated the procedure adopted at the Lock Hospital with puerperal cases suffering from venereal sores.

Sir Arthur Macan thought the increase in the number of cases treated in the Rotunda was due to an increase in the number of external cases, which he remembered at one time only amounted to 70 per annum. It was found that the poison inducing eclampsia was lactic acid, sulphuric acid, or some other such substance. The great treatment for eclampsia was to deliver the woman. As regarded manual or operative methods of emptying the uterus in abortion, the former was preferable where possible. But where the os was tight, it was better to use the curette than to dilate the cervix. In cases of acute sepsis, it was questionable whether operative treatment was of much avail. He was not certain of the brilliant results of ligaturing the pelvic veins.

Dr. Hastings Tweedy said that he would indeed be difficult to please were he not more than gratified at the very excellent reception accorded to this year's maternity report, and it was all the more gratifying to note the keen manner in which the different portions of the report were dealt with and criticised. He found himself in accord with practically all Professor Smith had said. Dr. Henry Jellett had very properly called attention to the case of one of the six women who had died, and who had been allowed to deliver herself naturally without interference, though the vulva was covered with suppurating sores. As a matter of fact, the delivery took place shortly after admission, and before active measures could be adopted. He believed with Dr. Jellett that such cases should receive very active disinfection before the birth of the child. His view as to the eclamptic statistics were that they should, at all events, be made to include the so-called uræmic convulsions, otherwise it was easy to persuade oneself that some of our fatal cases should be ascribed to this condition rather than to eclampsia. He spoke of the great work Sir Arthur Macan had accomplished during his Mastership in improving the aseptic condition of the hospital, and this in spite of the greatest structural imperfections. It was a mistake to think that Continental authorities were unanimous in the basis they adopted for estimating morbidity. As a matter of fact no such unanimity exists, and, if the maternity hospitals in the British Empire can only be persuaded to adopt the index of morbidity laid down by the British Medical Association, he believed that the good which will follow could hardly be exaggerated.

# ABSTRACTS.

## SECTION OF OBSTETRICS.

*Friday, November* 17, 1905.

The PRESIDENT in the Chair.

THE PRESIDENT'S Address dealt with the early history of the Obstetrical Society, which was inaugurated in November, 1838, under the Presidency of Doctor Evory Kennedy, Master of the Rotunda Hospital, in one of the rooms of which its meetings were held for nearly twenty-five years subsequently. In 1862 the constitution of the Society was altered, and the late Dr. Kidd became Secretary. The objects of the Society were primarily the study and elucidation of obstetrics and gynæcology; further, the investigation of the structure and diseases of females and their treatment, the physiology of reproduction with its comparative anatomy, fœtal structure and physiology, infantile development and disease, and medical jurisprudence. The names of many of the distinguished obstetricians and gynæcologists were recalled, and allusions were made to their writings, especially those of Dr. Churchill and Dr. M'Clintock.

DR. DE LA HARPE, by special permission of the Council, then read a paper on "The Results obtained in the Treatment of Eclampsia in the Rotunda Hospital" (see page 281, *ante*).

DR. TWEEDY showed the following card specimens :—(*a*) Eleven myomatous uteri removed by abdominal hysterectomies; (*b*) myomata removed from three uteri abdominal myomectomies; (*c*) one myoma of cervix; (*d*) one cancer of body uterus—Wertheim's operation; (*e*) two cancers of cervix—vaginal hysterectomies; (*f*) one epithelioma of vulva; (*g*) four ovarian cysts; (*h*) two ovarian dermoids; (*i*) one ovarian cancer; (*j*) diseased tubes removed from four patients; (*k*) three tubal pregnancies.

*Friday, December* 15, 1905.

The PRESIDENT in the Chair.

DR. R. C. B. MAUNSELL showed a uterus removed by Wertheim's method for carcinoma of cervix.

DR. JELLETT asked if he had found the separation of the ureters, as Wertheim described it, easy? Wertheim said that if the ureter was isolated it sloughed; but when were you not going to isolate it if it ran through or on top of a carcinomatous mass? If this is so, it would seem to be a necessary part of the operation to remove this isolated portion and reinsert the ureter into the bladder. He did not see any difficulty in the rest of the operation.

The PRESIDENT said that in the removal of a cancerous uterus one of the chief things was the safety of the ureters, and this was difficult to provide for. It was an interesting point that so many glands were examined and found to be free from cancer. His own feeling was that the uterus should be removed in every case in which there appeared to be even a slight chance of the patient getting over the operation, and they should try to relieve suffering.

DR. MAUNSELL, in replying, said that he too thought that the operation should be done if possible, as he believed the suffering was less when a patient died from a secondary growth, as in the liver, than from the primary one. The ureter had to be separated if you were going to extirpate the parametrium, and he would not have the least hesitation in doing it, as he thought there was little danger of sloughing, so long as one did not pinch the ureter in any way. He had found it pretty hard to carry out Wertheim's procedure—namely, to lay the finger on the ureter and pass the finger between the ureter and the uterine vessels. There was nothing very difficult in the operation, but it was rather lengthy.

DR. HASTINGS TWEEDY showed a retro-peritoneal sarcoma.

DR. ROWLETTE described the pathology of the tumour.

The PRESIDENT described a somewhat similar case in a girl aged seventeen. There had been steadily-increasing distension of the abdomen for two years. Urine loaded with albumen. Operation revealed a tumour weighing 17 or 18 lbs., in the retro-peritoneal tissue in the region of the left kidney, which was free

Dr. Goulding asked if there was a mesentery in connection with the tumour, as it was hard to conceive that the vessels underneath would not otherwise be pressed on.

Dr. Tweedy, in replying, said that the tumour was absolutely fixed to the spine, and he had been surprised that there was no evidence of pressure on the vessels. This class of tumour could not be diagnosed before the abdomen was opened, and once this was done the surgeon should always complete his operation.

Dr. Hastings Tweedy read a paper dealing with "A Study of Two Hundred and Eleven Major Operations" (see page 290, *ante*).

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*Friday, February* 2, 1906.

The President in the Chair.

Sir A. Macan exhibited a specimen of degenerated uterine fibroid. He said that after opening the abdomen of the patient he found the tumour pedunculated, and with adhesions. On section the tumour gave evidence of being an ordinary fibroma. Pain had previously been complained of. This form of red degenerative change is said usually to begin in the centre of these tumours. They are liable to be coloured and to slough.

Dr. Alfred Smith exhibited a specimen of a myomatous uterus undergoing sarcomatous degeneration. The patient was about forty-five years old, married, but had no family. Her menses had ceased. Operating he found a mass of brown matter, which he took to be a polypus. He removed the entire uterus. Professor McWeeney's report on the specimen showed, apparently, a polypoid formation projecting from the mucous membrane of undoubted sarcomatous structure. The sarcoma tissue itself was undergoing mucoid degeneration in some places, otherwise the uterus was in an advanced stage of fibro-myomatous overgrowth. Slides demonstrating the sarcomatous changes were also shown under the microscope.

Dr. Hastings Tweedy considered that Dr. Smith's case showed the necessity for the early removal of all myomata.

Dr. Jellett suggested that in Sir A. Macan's case the red degeneration might have been the result of bacillary infection.

Dr. Purefoy instanced a case in which he removed a tumour from an unmarried woman, which underwent a dark, mahogany-brown discoloration, almost identical with that seen in Sir A. Macan's specimen, and in which the change was due to teleangiectasis.

Dr. Jellett showed two carcinomatous ovaries and a uterus removed from a patient aged forty-seven. The tumours were so fixed in the pelvis that at first sight their removal appeared impossible, but, on making a transverse incision from the centre of the usual mesial incision outwards towards the left anterior superior spine, it became possible to pass the fingers below the left ovary, and so to work across the pelvis to the right. The broad ligaments were so infiltrated that it was impossible to tie them, and the uterus was in consequence removed, hæmorrhage being controlled by two clamps passed upwards from the vagina. There was a large collection of very foul pus in Douglas's pouch, and from this an infection of the abdominal wound resulted. The patient, whose pulse at the end of the operation was 160, made an uneventful recovery, save for the wound infection. At the present time, six months after the operation, she states that her health has been good, and that she has gained in weight. On examination, however, it is probable that a return is taking place in the tissues round the rectum.

Dr. Jellett also showed a double pyosalpinx and the remains of an extra-uterine fœtus removed from a patient who had been pregnant eighteen months before the operation, and who had believed that she had miscarried. No ovum, however, was seen at the time, and the condition of the removed fœtus made it probable that it had been retained since the supposed miscarriage. The fœtus was aged about four and a half months.

Dr. Kidd said the first case reminded him of one of sarcoma of the ovaries, in which the hæmorrhage was so profuse after removing one ovary that he decided to let the other alone.

The President doubted the value of operation in such cases.

Dr. J. Spencer Sheill then read a paper entitled "Sequel to an attack of Eclampsia" (see page 307, *ante*).

*Friday, April* 6, 1906.

SIR ARTHUR MACAN in the Chair.

DR. J. S. ASHE showed a new cystic ovary perforator and forceps.

DR. HORNE exhibited a "myoma of the uterus showing cystic and calcareous degeneration." He said the patient was aged forty-five and the mother of six children, and had menstruated regularly. The tumour occupied the whole abdominal cavity. It resembled an ovarian tumour, as there was considerable feeling of softening about it. Notwithstanding the large size of the uterine cavity, the clinical history revealed no menorrhagia. A loud tympanitic note could be elicited in front of the abdomen. On removal of the tumour he found it contained a large degenerative cystic cavity, with a number of small cysts and calcareous areas. The report of the pathologist (Professor McWeeney) showed that the organ was enormously enlarged owing to intra-mural fibroids, and in the centre is a cavity resembling a cyst. The microscope shows the tissue of the tumour to consist of unstriped muscle, and the cyst to be a "pseudo-cyst"—*i.e.*, one due to ischæmic necrosis of the muscle and its gradual softening. There are no genuine cysts in any of the sections, and no evidence of malignancy.

DR. HASTINGS TWEEDY said he would like to know whether a pedicle was looked for through the rectum in this case? He did not believe that the size of the uterus was a necessary feature of distinction between ovarian cyst and myoma. Sub-peritoneal myomata were not likely to enlarge the uterus.

DR. R. J. ROWLETTE said he had examined some specimens which simulated the appearances of the one shown.

SIR ARTHUR MACAN said he had come across a case in which a true fibro-cyst was manifest, the fluid of which coagulated on exposure. He did not know whether the pathology of this coagulable condition was thoroughly determined or not.

DR. HORNE, in reply, said the patient after admission to hospital had a febrile attack, and had the facies of a person suffering from ovarian tumour. The muscles of the chest and forearms were wasted. The tumour and the cervix uteri were one body. He did not make a rectal examination for a pedicle, as the case admitted of no doubt, though he appreciated the value of that procedure in ovarian disease.

Dr. Hastings Tweedy exhibited a specimen of cancer of both ovaries. He said the patient was a girl of twenty-one, who had been operated on in a city hospital some weeks previously for an ascitic collection, supposed to be the result of tubercular peritonitis. She entered the Rotunda Hospital five weeks afterwards, in an apparently dying state, and enormously distended by peritoneal dropsy. On opening the abdomen he found the intestines tucked up under the diaphragm and very adherent to each other; they, together with the entire peritoneum, were studded with coarsely granular masses, which he remarked at the time of the operation resembled endothelioma rather than tubercle. The ovaries appeared papillomatous, and were both removed. The abdominal cavity was drained with five wicks of iodoform gauze in the hope that they would be the means of causing an adhesive peritonitis, and so obliterating the weeping surfaces. For several days she poured fluid through the drains, but this gradually became less, and she left hospital symptomatically cured, and declaring that she was feeling better than she had done for two years. Dr. Rowlette, who examined the pathological condition of the parts removed, would be able to deal more fully with the microscopic findings.

Dr. R. J. Rowlette said the tumours were of a nodular character, the nodules varying from the size of peas to that of beans. In the substance of the nodules there were small cysts, some of these being filled with a clear, and others with a blood-stained, fluid. Both ovaries were similarly affected. Microscopic examination revealed masses of large cells, with a slight fibrous stroma. He regarded the tumour as an endothelioma, originating probably from the endothelium of the peritoneum.

Sir Arthur Macan said he recalled a case in which, when the abdomen was opened, a large tumour, thought to be malignant, was apparent. On removing the tumour the patient got quite well; but the diagnosis of malignancy was possibly not correct. It was interesting to note how drainage, in the case under discussion, had the same beneficial effect as excision had on tubercle.

Dr. Hastings Tweedy said he had examined the patient that morning. Her abdomen was hard, and the cancer seemed again advancing.

October

BED No. 34 **ROTUNDA LYING-IN HOSPITAL.**

Name H B age 33

Admitted Oct 24th at 4.45 a.m. 1905 No. of Pregnancy 5th Period of Pregnancy Term

**Previous History.**

Previous Labours Normal Abortions Premature Full Term 4

Date of last Labour October 1902

Last Menstruation commenced first week in January 1905

State of health during Pregnancy good On Admission good

Pelvic Measurements, R.C. 10 m. Cris. 27 Is. Sp. 25½ Is. Cris. Trans. Girth

**Diagnosis.**

| | Day | Hours | Hour AM | Hour PM | Surgeons |
|---|---|---|---|---|---|
| Abdominal Palpator 1st vertex | 24 | X | 5.20 | | M. Ryan |
| Vaginal Examination | | | | | |
| L. | | | | | |
| 2. | | | | | |
| 3 | | | | | |
| 4 | | | | | |

**Labour and Delivery.**

Labour commenced 24th of October at 3 a.m. p.m.

Membranes ruptured at birth

Infant Born October 24th 6 a m

Placenta delivered in 20 minutes

Presentation vertex Position 1st Nature of labour normal

Membranes complete

Placenta complete

Examined before admission

Perinæum intact

Student C. Sheahan Nurse in charge Ryan

**Puerperium.**

Date of first leaving bed October 30th

Date of discharge October 31st 1905 Condition when leaving Hospital convalescent

Day Nurse in charge Hayes Night Nurse in charge Winnold

NOTES :—

**Infant.**

Sex F. Weight 5½ lbs. ozs. Length 16½ ins. Condition at birth Alive

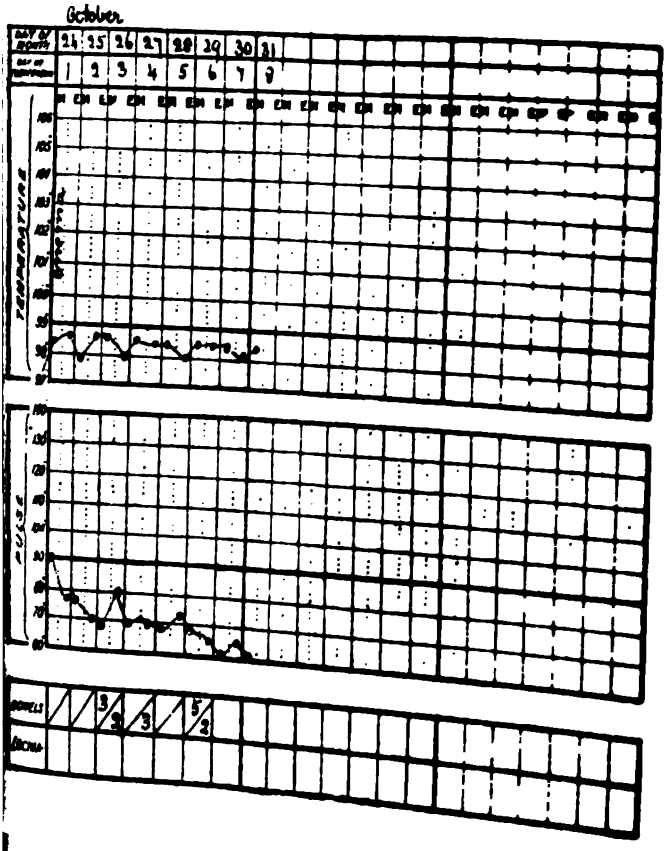
Mode of feeding breast

Condition when leaving Hospital healthy

Bowels regular

NOTES :—

one which he had brought before the Academy at the beginning of the Session in that there was no pre-operative infection, and that, consequently, the abdominal wound escaped infection, and also that there was not so extensive an extension of the growth.

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Rotunda

BED No. 34½

# ROTUNDA LYING-IN HOSPITAL.

Name H B age 33

Admitted Oct. 24th at 4 a.m. 1905 No. of Pregnancy 5th Period of Pregnancy Term

PREVIOUS HISTORY

Previous Labours normal Abortions Premature Full Term 4

Date of last Labour October 1902

Last Menstruation commenced first week in January 1905

State of health during Pregnancy good On Admission good

INFANT

Sex F Weight 5½ lbs. ozs. Length 16½ ins. Condition at birth alive

Mode of feeding breast

Condition when leaving Hospital healthy

Bowels regular

Notes :—

one which he had brought before the Academy at the beginning of the Session in that there was no pre-operative infection, and that, consequently, the abdominal wound escaped infection, and also that there was not so extensive an extension of the growth. The patient was operated on on May 4, and she is now about to leave hospital apparently well.

DR. E. HASTINGS TWEEDY showed a specimen of "Intussusception in an Infant." He said the child was born in the Rotunda, and on the second day had hæmorrhage from the bowel. It died on the third day. At the *post-mortem*, intussusception was discovered. He did not think that such a condition could have occurred after death. Diagnosis was impossible during the life of the child.

DR. ROWLETTE considered that the blood clot must have taken place from the point of the intussusception, and was *ante mortem*.

DR. E. HASTINGS TWEEDY read "The Report of the Rotunda Hospital for 1904–1905" see page 321, *ante*.

# SECTION OF PATHOLOGY.

## AN UNUSUAL TUMOUR OF THE KIDNEY.

By C. ARTHUR BALL, M.D., F.R.C.S.I.;
Assistant Surgeon, Sir Patrick Dun's Hospital, Dublin.

[Read in the Section of Pathology, November 24, 1905.]

The notes of the case are briefly as follow:—

The patient, a young married woman, aged twenty-three, gave birth to a healthy child in the Rotunda Hospital on August 4, 1905.

She states that about five days afterwards she noticed a small lump that moved about in the left side of her abdomen; she said nothing about this for fear she might be kept longer in hospital. Three weeks later, she showed her lump to one of the doctors at the Rotunda, who told her it was a floating kidney, and to come back again in a week if it was not better (I saw him, and he told me that the tumour was extraordinarily moveable). She returned in a week, and as the lump had grown larger she was shown to Dr. FitzGibbon, who sent her to me. I was away from home, and as she could not leave her baby then to come into hospital I did not see her until a week later, on September 30th, and those who had seen her the week before said the tumour had increased enormously in size during the week. She was admitted to Sir Patrick Dun's Hospital that day.

On examination, the left side of the abdomen was filled with a large tumour extending nearly to the middle line, the tumour was rather soft, but still had a solid feel. Two or three nodules

could be made out on the anterior border; these were slightly tender to palpation, but beyond this the tumour was quite painless. With one hand in the loin, the tumour could be tilted slightly forwards; it did not move up and down during respiration. The urine was normal. She never had hæmaturia.

Thinking the tumour was probably of renal origin, the bladder was examined with the cystoscope, the left ureteral orifice (the side of the tumour) was very small, and although watched steadily for some minutes no movement or efflux of urine took place. The right ureteral orifice was about four times the size of the left, and urine was being discharged every few seconds, this rapidity of excretion being accounted for by a large draught of water given to the patient shortly before examination.

It seemed certain that the left kidney was not functionating, but in order to confirm this a Luy's segregator was passed into the bladder, and a separation of the urine from each kidney kept up for ten minutes, during which time 56 c.c. of urine were collected from the right side and 2 c.c. from the left, that from the right coming in normal gushes, from the left, an occasional drop. As there was the same amount of urea present in each specimen it was evident that the 2 c.c. of fluid had leaked over from the right half of the bladder, and this was easily accounted for by the fact that the urine came so rapidly from the right side, that the collecting tube had to be quickly changed in order not to lose any of the fluid, and this caused a slight shake of the instrument on three or four occasions. From this examination, conducted painlessly without even cocaine anæsthesia, it was quite certain that the patient was depending entirely on the right kidney, and therefore there was no anxiety about this point in advising removal of the tumour.

It seemed as if a hydronephrosis might easily explain the conditions present, but the tumour did not give one this idea on palpation.

On October 4—that is seven weeks after the tumour was first noticed—an incision was made on the left side of the abdomen in the direction of the external oblique muscle, the internal oblique and transversalis muscles were divided in the direction of their fibres, and the peritoneal cavity opened sufficiently to admit the hand; the upper and lower limits of the tumour were

then made out, and it was thought possible to remove the kidney. The skin and muscle incision was therefore extended backwards parallel to the last rib, the peritoneum was lifted up off the tumour, which was covered with enormous veins, as thick as one's little finger. The kidney in places was very adherent, and for some time it was doubtful whether its removal would be possible, but gradually the lower and upper poles were freed, and during this procedure the opening in the peritoneal cavity was frequently of assistance.

The tumour was eventually delivered from the wound, and the renal vessels and ureter, which was very small, were ligatured and the kidney removed. In spite of the large accessory blood supply, the patient lost but little blood and suffered surprisingly little shock.

The after history of the case was satisfactory and uneventful, the patient returning home three weeks after the operation.

The kidney weighed exactly three pounds; the renal vessels did not seem much larger than normal, the tumour apparently deriving its blood supply largely from the vessels surrounding it.

That a solid tumour of the kidney can grow so rapidly is a point of considerable interest—possibly the termination of pregnancy had some relation to the rapid growth of a pre-existing tumour.

Professor O'Sullivan, F.T.C.D., has kindly examined the tumour for me, and reports as follows:—

The tumour was an encapsuled lobulated mass, roughly ovoid in shape, with a pointed apex. It measured, after being some time in formalin, 9¼ inches in length, 6 inches in greatest breadth, and 15½ inches in circumference in the middle. On cutting into it, it was seen that the pointed apex was formed by the kidney, which lay like a cap on the new growth, and then divided and passed down on each side in a layer of kidney substance, which, becoming thinner and thinner, surrounded the growth for about half its circumference. In the upper part the growth was in many places separated from the kidney by two layers of firm white tissue with a space between them, which spaces communicated with the calices inside the kidney, and evidently repre-

Mr. C. Arthur Ball—"An Unusual Tumour of the Kidney.

Mesial section of tumour, showing the kidney substance above the new growth.

sented compressed calices. Lower down the growth was still separated by a single layer of white tissue from the kidney substance, while further down still the kidney substance disappeared, and the growth lay directly beneath the capsule which covered the whole tumour, kidney, and new growth together. The hilus of the kidney, with the ureter and vessels, lay on the upper part of the posterior aspect of the mass, and communicated with the compressed pelvis.

The growth itself, on section, showed a very diversified appearance. The central part contained a mass of firm connective tissue containing a few yellow soft nodules. Radiating out from this to the periphery were a number of large lobules, which made up the main mass of the growth; some of these were greyish white, uniform in texture and colour. Others were yellowish, soft, and in parts broken down, while one was uniformly red, firm and smooth. In others, again, these appearances were mixed together in all proportions, greyish, white, yellow, broken down and red hæmorrhagic areas alternating.

Portions were taken from various parts of the growth, and sections cut. The different portions showed great diversity of appearance. In some parts the growth was made up of papillary processes containing a core of hyaline connective tissue lined by one or two layers of low cubical epithelium, in others were spaces lined by one or two layers of low cubical epithelium, in others were spaces lined by similar epithelium, some with papillary growths projecting into them, some empty, others filled with blood, while others again contained a homogeneous material which stained a light brown with Van Gieson's stain. Many parts were necrotic and showed no structure. In the central parts of the growth, the cells in some places filled the spaces, while the lining cells still remained in regular order. In others, again, all order was lost, and the appearance was that of solid masses of epithelial cells with a few strands of hyaline connective tissue among them, such an appearance as is found in a soft cancer.

In the capsule, the remains of kidney substance could be detected in the parts nearest to the kidney. Further down they were entirely absent, and the capsule consisted of firm fibrous tissue with few nuclei or vessels.

PROFESSOR O'SULLIVAN said the tumour was an encapsuled lobulated growth lying in the enlarged pelvis of the kidney, which it completely filled. The kidney and tumour were enclosed in a single capsule, the kidney lying above the tumour. There was a good deal of necrosis, with hæmorrhage into the necrosed tissue. The microscopic appearances were various, showing, in different parts, papillæ covered by cubical epithelium, spaces lined by a similar epithelium, some invaded by papillæ and irregular masses of epithelium, with a few strands of hyaline connective tissue separating them.

PROFESSOR MCWEENEY said that he had read a paper some years ago before the Section on tumours of aberrant supra-renal origin, and one of the specimens he then described was similar to Dr. Ball's. He did not think the fact of the tumour lying underneath the kidney was against its being of supra-renal origin, as the great majority of these tumours had been found starting from the pelvis of the kidney. He pointed out that what was described by Prof. O'Sullivan as delicate connective tissue papillæ, with cubical epithelial cells on each side, was precisely the structure that was found in supra-renal tissue tumours. He asked if Professor O'Sullivan had tested for glycogen, as it was supposed to be found in a large majority of these cases.

DR. EARL said he had seen a tumour which resembled the one before them very largely in its histology, but the naked eye appearances were different. It was much softer, almost diffluent. Sections from different parts of it differed very largely. He did not form any opinion as to its origin, but could not persuade himself that it was supra-renal. He could not tell if it was malignant or not, but he had seen tumours of the kidney which, if they had occurred in any other part of the body, would have been considered malignant. He had followed out some cases in which big tumours had been removed, and no recurrence had taken place. There was no organ of the body in which it was so difficult to say of what nature a tumour was as the kidney.

MR. GUNN described a case in which the clinical history was somewhat similar to that of Dr. Ball's case. The tumour was quite small, and symptoms pointed to bladder trouble. The cystoscope showed that no urine was coming from the affected

side. He saw the case four weeks later, and the tumour had greatly increased in size.

Four years ago he showed a girl, aged fourteen, who had had a rapidly growing tumour of the left kidney. It had grown in the pelvis of the kidney, and extended down the ureter. Microscopical examination showed a distinct papillary growth, with nowhere more than two or three layers of cells. It was supposed to be an adeno-fibroma or intra-canalicular fibroma. There had been no recurrence, and the case had done well.

Mr. Ball replied.

Professor O'Sullivan said he had not examined for glycogen, but would do so. The appearance of the cells was so unlike that of supra-renal cells, or even what he remembered of those in the tumour Professor McWeeney himself had shown that he could not believe it was of supra-renal origin.

## Dr. T. Gillman Moorhead—"A Case of Melanuria."

Under-surface of Liver, showing Cyst-like Melanotic Tumours.

that her abdomen and feet had begun to swell. Her periods had been quite regular up to July, but had ceased since that month.

On admission the patient was found to be greatly emaciated; her weight was eight stone and three pounds; her face was drawn and rather yellow-looking; the scar in the orbit was quite healthy and normal in appearance, and the right eye was quite healthy. The chest muscles were very atrophic; heart normal; the lungs exhibited râles and rhonchi over almost their entire extent, both back and front, but showed nothing abnormal to percussion. The abdomen was enormously distended, the superficial veins standing out quite prominently, and presenting a flow from below upwards, and the skin was thin and glossy. On palpation hard nodules of about the size of a walnut could be distinctly felt all over the upper two-thirds of the abdomen, and even extending downwards into the iliac fossæ on both sides. These nodules could be felt, and even at times seen to move, under the abdominal wall with respiration. Intervening between them and the wall, however, there was a thin layer of fluid, which fluctuated freely, and which could be displaced readily by gentle pressure. This layer of fluid was most noticable over the right side, and extended upwards to the level of the ribs. It only moved slightly with change of posture. On percussion the abdomen was found to be dull over its anterior aspect, from the costal margin down to below the level of the iliac spines on each side, except for a transverse area of resonance a couple of inches above the level of the umbilicus. The flanks were resonant on each side in every position, and even on sitting up; there was no dulness above the symphysis pubis. The lower edge of the liver could not be distinctly defined either by feel or by percussion; the spleen dulness appeared normal in extent. By vaginal examination some indistinct fluctuating masses were felt, but no definite diagnosis as to what they were was arrived at. There was considerable œdema over the lumbar region and in the legs. Temperature normal; pulse 80; respirations 24.

*Blood Examination.*—Red blood corpuscles, 3,000,000 per c.m.; white cells, 12,000 per c.m.

*Differential Count.*—Neutrophiles, 76 per cent.; lymphocytes, 19 per cent.; hyaline cells, 4.5 per cent.; eosinophile cells, .5 per cent.

The blood when tested for melanin gave a negative result, and no melanotic granules were present, such as have occasionally been described.

Shortly after admission the amount of fluid in the abdomen increased greatly, and had to be removed, 80 ounces being withdrawn on October 16th. The ascitic fluid contained a large quantity of blood, but failed on this and on other occasions to give any melanin reactions. A few days before the patient's death 40 ounces of fluid were again removed, and presented similar characters to those of what was first drawn off. The blood picture underwent a gradual change, the leucocytosis gradually increasing up to 35,000 per c.m., with a count of neutrophiles up to 87 per cent., while a few myelocytes, both granular and hyaline, made their appearance. The red cells sank to just under 1,500,000 per c.m., and a few nucleated red cells (normoblasts, some of which contained dividing nuclei) were found. Death occurred from asthenia on October 26th.

*Post-mortem*—Only a partial examination was permitted, and consequently it was impossible to examine the stumps of the left optic nerve, the brain, spinal cord, or joints.

The lungs were somewhat œdematous, were very anæmic, and were studded over the surface with a few small melanotic growths. The heart was normal, except for one small tumour situated in the anterior wall of the left ventricle. The liver was enormous, weighing thirteen and a quarter pounds, and extending right down over both iliac fossæ. Its whole substance was infiltrated with black tumours, varying in size from that of a pea to that of a Tangerine orange. Many of them projected on the surface, and constituted the nodules felt by palpation through the abdominal wall. The liver substance between the masses was microscopically normal. The transverse colon lay in front of the liver in the position of the transverse area of resonance above alluded to. The stomach and intestines were normal, except for the fact that the small intestines was only fourteen feet in length, and presented valvulæ conniventes right down to the ileo-cæcal valve. The peritoneum did not contain any actual melanotic nodules, but in many places was of a diffuse black colour. The spleen contained two small nodules, and was normal in size. The kidneys, slightly fibroid, also contained a few scattered nodules, as did the supra-

renal capsules. Both these last-named structures were unusually large. The pancreas and abdominal lymph glands were normal. Two large ovarian cysts were present, floated up by ascitic fluid above the brim of the pelvis, their wall being constituted by dense black melanotic tissue, about one-fourth of an inch in thickness. The fluid contained within them was of a dirty brown colour, but did not give the melanin reaction.

*Urine.*—The quantity of urine passed in the twenty-four hours never exceeded twenty ounces in volume. When first passed it was of a deep amber or slightly reddish tinge, but after standing for a few hours it became darker in colour, and ultimately almost black. It usually contained a deposit of urates, of a deep brownish tinge. A slight trace of albumen was present, but no blood. It gave the following reactions :—

1. Von Jaksch test.—The addition of a few drops of dilute perchloride of iron resulted in the production of a deep violet black colour and of a violet grey precipitate, which re-dissolved in excess of the re-agent. When the precipitate was dissolved in sodium carbonate and an acid added a blackish precipitate was again thrown down.

2. The addition of sodium nitroprusside and a few drops of liquor potassæ produced a violet colour, changing to blue with acetic acid.

3. Blackening was also obtained with the following concentrated acids :—Nitric acid, sulphuric acid, chromic acid, hydrochloric acid, and with bromine water. Weak acids had very little effect or else caused a slight deepening of the already dark colour of the urine.

4. Phosphomolybdic acid and strong sulphuric acid gave a light green coloured precipitate.

5. The addition of caustic alkalies caused the colour of the urine to become lighter and to assume a reddish tinge, which was, however, again changed to violet on the further addition of an acid. Concentrated phosphoric acid produced much the same effect as the alkalies.

6. The copper test for sugar and the phenyl-hydrazine test gave negative results, but Nylander's re-agent was immediately reduced on boiling.

7. The iodoform test for acetone was negative.

8. The indican test (hydrochloric acid and bleaching lime) gave a deep violet-black coloration, but this colour was not absorbed by chloroform.

9. When the urine was precipitated with barium chloride and filtered, the filtrate gave the characteristic reaction with the perchloride of iron.

From the above reactions no doubt at all can be felt that the substance present within the urine, and to which it owed its deep colour, was melanin, although what exactly melanin may be is a matter which has not yet been decided. Garrod has pointed out that the condition of melanuria in its wider sense was recognised even before the days of Hippocrates, but the clinical recognition of the above described variety dates only from 1861, when Eiselt of Prague reported that the urine of patients suffering from melanotic sarcoma became dark on the addition of strong acids.

In 1887 an elaborate paper by Mörner appeared in the *Zeitschrift für physiologische Chemie*, and contains a complete bibliography up to that period. It contains an account not only of the pigment of melanotic tumours, but also of the other dark pigments of the body, including that of the negro's skin and of the choroid coat of the eyeball. Mörner points out that the various analyses that had up to that time been made public differed in two important particulars—namely, in the proportion of sulphur which the pigment was found to contain and in the presence or absence of iron within its molecule. His own conclusion was that it contained both sulphur and iron, and subsequent observations have confirmed that view, though most systematic writers still persist in their denial that it is an iron-containing body, or rather, to express the view of von Jaksch, that it is a group of iron-containing bodies.

Apart, however, from its chemical constitution the substance is of considerable diagnostic importance. When its presence in urine was first announced many cases were

reported in which no melanotic growths were present, but an analysis of these cases seems to show that all of them were examples of extreme indicanuria. Since, however, the publication of the iron test by von Jaksch in 1889 a ready means of differentiating the two conditions exists, and it is now almost universally believed that melanuria is pathognomonic of the existence of melanotic neoplasms. Not all cases of such, however, give the reaction, and the weight of evidence seems now in favour of Garrod's opinion—that melanuria occurs only when the tumours have extended from their primary site to the internal viscera, and more especially to the liver. In this case it is, of course, impossible to say at what time the reaction appeared, but the *post-mortem* findings are at any rate in agreement with his opinion that the amount of melanin present is in direct relation to the liver involvement.

In conclusion, it is interesting to note the large number of years that the tumour remained localised and the rapid progress, measured by weeks, which the case made once the primary barrier was overstept.

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Dr. Travers Smith asked if the bromine water test for melanin had been done? Were there any cutaneous sarcomatous nodules?

Professor O'Sullivan said that it was curious that a reduction should take place with bismuth in Nylander's test, and there was no reduction in the copper test. Perhaps some different reaction took place not the same as sugar.

Dr. Mooney said he had the original tumour. It occupied the orbit, and was the blackest tumour he had ever seen. The sclerotic was invaded, and after removal of the eye the remaining tissues were still infiltrated with black pigment.

Professor McWeeney said he had seen cases of acid melanuria due to the action of carbolic acid, but had not seen any cases of extensive melano-sarcoma.

Dr. Moorhead, in replying, said that he did try the bromine water test, but it gave a black precipitate, just like the others.

There were no cutaneous lesions. He thought that von Jaksch's was now admitted to be the best test. In reference to Nylander's test, he said he had repeated both it and the copper test on two or three occasions. He got a slight reduction with copper, but only on prolonged boiling, but Nylander's test came out unusually quickly. He did the phenyl hydrazin test, and did not get any characteristic crystals.

# A CASE OF CHRONIC HYDROCEPHALUS.

By JOSEPH O'CARROLL, M.D., F.R.C.P.I.;
Physician to the Richmond, Whitworth, and Hardwicke Hospitals.

[Read in the Section of Pathology, January 5, 1906.]

HYDROCEPHALUS is an accumulation of serous fluid in excess within the ventricles of the brain. Two causes appear to be mainly responsible for this condition; the first, an active over-secretion of the ependyma which lines the ventricles and covers the choroid plexuses; the other, an obstruction to the outflow of the normal contents of the ventricles or of the veins of the choroid plexuses. Obstruction of the veins may be caused by a tumour at any part of their course, but chiefly where they are gathered together in the venæ Galeni. Obstruction to the circulation outwards of the serous fluid of the ventricles may be determined by a lepto-meningitis inducing thickening or adhesion at the several points at which the pia mater is normally fenestrated. The position longest and best known is the posterior wall of the fourth ventricle where the foramen of Magendie and at least two lateral holes pierce the pial layer descending from the cerebellum to the margin of the calamus scriptorius. Fissures or clefts have been described by Merkel as occurring in the descending horns of the lateral ventricles—that is to say, in the temporo-sphenoidal lobes—permitting a similar communication between the intra-ventricular and sub-arachnoid spaces. In Volume XII. of the Transactions of the Academy I have described two cases of hydrocephalus associated with thickening of the pia mater roofing the fourth ventricle, with occlusion of its foramina. I shall now describe a case in which the causation is not so clear,

but which was certainly not due to obstruction of the efferent veins of the ventricles.

D. W., a Dublin boy, aged sixteen, was admitted to hospital under my care in November, 1903, as having had headaches, with vomiting and some deterioration of intelligence for the past few years. Six years ago he was a strong, healthy, and apparently intelligent boy, when, one day while playing football he received a kick on the left side of the forehead, which was cut, and bled a little. The scar and a slight flattening on the left frontal eminence still remains. Soon after this he was seized with headache and vomiting, which passed away in a few hours. A few weeks later his mother noticed him getting "dull and silly-looking," especially on awaking in the morning. This condition became slowly aggravated in the course of the next two years; while his appetite for food increased to four times its original amount. About this time the schoolmaster informed his mother "that there was no good in keeping him at school, as he could learn nothing." It was noticed that when he was sent out to do two or more errands he remembered only one of them, usually that one which was told to him first. His head, face, and body became large, and his expression rather vacant. About every three months he gets fits of unconsciousness for a couple of minutes, followed by retching of white froth, which, towards the end, becomes blood-stained. After these fits he feels better.

His parents are alive and healthy. Four brothers died in infancy, two of them of "convulsions." No history of miscarriages nor other suggestion of syphilis. At the boy's birth the mother was delivered by forceps under chloroform, and "his head appeared mis-shapen afterwards;" not a very uncommon event.

The boy is somewhat foolish-looking; the upper lip prominent, the front teeth projecting, the mouth gaping. The head is rather large, not unsymmetrical; the eyes prominent. Horizontal measurement of head, 23¼ inches (59 c.m.); between the roots of the ears across vertex, 12 inches (30.5 c.m.); from root of nose to occipital protuberance, 14 inches (35.5 c.m.). The palate is high and narrow. He is rounded and feminine in build; the genitals infantile; the skin over nearly all the body

is curiously tight, as it ordinarily is over the outer side of the thigh, but the texture of the skin is apparently normal. There is apparently neither scleroderma nor myxœdema. The skin is simply slightly difficult to pinch up.

In conversation the patient does not seem very stupid, but he is forgetful. He reads well, writes fairly, and is capable of simple mental calculations. He is neither ataxic nor spastic in gait. He says he used to strike the toes against the ground, and there are marks of bruises on both big toes, which he attributes to this. Babinski's sign is present on both sides. The feet are purplish in colour, and the toes are straight and wooden-looking, as if they had never been confined in boots. Sensation is quite normal for touch, heat, cold, and pain. Sight is normal, and the pupils react normally.

Dr. Joyce reports:—Right eye—optic nerve shows considerable physiological whiteness and cupping below and externally; above and within, most probably some neuritis (elevation, 0.5 m.m. above retina). Left eye—neuritis (papilla projecting 0.75 m.m.), apparently not progressive.

December 13th.—Some discharge from right ear, which had disappeared under treatment by 26th.

He left hospital on 30th December, 1903, improved as to headaches, and not having had anything which could be called a fit. The diagnosis of chronic hydrocephalus had been written on his chart.

He was again admitted under my care on the 12th October, 1905, after an interval of a year and nine months, in a semi-stuporose state, with headache and vomiting. We learned that he had had frequent, almost nightly, epileptiform attacks up to eight months before. He then began to fall into states of semi-stupor, preceded by severe headache, and accompanied by frequent vomiting. During these attacks, which last two or three days, and which recently have occurred almost weekly, he lies on his back, with head retracted, and can be roused with difficulty.

A fresh examination reveals nothing new in his general condition. All the important organs, except the brain, appear to be healthy. The urine, 1020, contains neither albumen nor sugar. He can stand, if supported, but otherwise falls. He

cannot be aroused to say more than "Yes" or "No," or "my head," as if in pain. He vomits frequently, suddenly, and without nausea.

Five days after admission he had ceased to vomit, had gradually become brighter in reply to questions, and was able to be up and walk about. His memory is poor, but his intelligence is apparently as good as usual. He drew our attention to a clear limpid flow from his left nostril, which has occurred from time to time during the past couple of months. It occurs now several times in the hour, and lasts a few minutes at a time. He complains of pain, or great sense of weight in the occipital region.

From the 18th October till the 2nd November he was up and about the ward. On the 23rd October, Dr. Joyce reports of the eyes:—"Pupils react somewhat sluggishly, directly and indirectly. Fundus of both eyes normal."

On the 2nd November, about 7 p.m., he began to be drowsy, and gradually sank into a semi-comatose state. He vomited frequently next day a greenish-yellow frothy fluid. On the 4th, a lumbar puncture yielded an ounce and a half (42 c.m.) of clear fluid, in drops, not in a continuous flow or jet. The fluid contained hardly any formed elements. The evacuation of the fluid made no change in his condition. On the 6th he was very restless, and on the 7th he died.

The following are the findings at the *post-mortem* examination made next day by Dr. Earl:—

All the organs healthy except the brain. The thyroid gland healthy. There were a number of points on the anterior surface of the temporo-sphenoidal lobes at which the brain was adherent to the underlying bone. At the tip of the left temporo-sphenoidal lobe, on removal of the brain, a thin piece of brain was left adherent to the bone, a small hole into the descending horn resulting. The membrane roofing in the fourth ventricle did not appear to be thickened. The ventricles of the brain were generally distended, and the foramen of Munro was much enlarged. The following measurements were made on the hardened brain:—Length of left hemisphere, 19.5 c.m.; greatest length of ventricle, 14.5 c.m.; length of right hemisphere, 19.5; greatest length of ventricle, 15.5 c.m. Except at the anterior

part of the temporo-sphenoidal lobes and the very tip of the right posterior horn, the brain substance was at no place reduced below 2 c.m. in thickness. The sella turcica was very large as a result of the distension of the third ventricle, not of any change in the pituitary body, which was simply flattened out. The internal surface of the ventricles and the choroid plexuses seemed normal.

As to the ætiology of the hydrocephalus in this case, I am quite at a loss for any dogmatic explanation. That an adhesive anterior basal meningitis had started it by obstructing the normal anterior drainage fissures is, I think, probable. Whether this meningitis had occurred early in life, embryonic or infantile, or later on as the result of the football accident, I am at a loss to decide. Infantilism has been shown to be a not very rare result of hereditary syphilis, and hereditary syphilis might well explain the basal meningitis. But, in the first place, there was nothing in the family history to suggest syphilis on the paternal or maternal side; and in the next, the infantilism here was not so extreme as I have seen in undoubted hereditary syphilis; nor were the teeth, the eyes, the nose, the skin, such as one sees with that condition. I am on the whole inclined to associate the meningitis and the resulting hydrocephalus with the football injury; and to explain the moderate infantilism, the curious, if poorly marked, firmness of the skin, and the slowing of intellectual development after the injury, with the moderate hydrocephalus, and possibly the interference with the full functioning of the pituitary body as one of the organs presiding over general nutrition.

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Dr. Earl described the appearance of the brain on making a *post-mortem* examination. There were a number of points on the anterior surface of the temporo-sphenoidal lobes where the

brain was adherent to the bone. Also at one point on the lower surface of the left temporo-sphenoidal lobe there was a thin piece of brain left adherent, a small hole resulting. The membrane over the roof of the fourth ventricle did not appear to be thickened. The ventricles of the brain were generally distended, and the foramen of Munro was much enlarged. The sella turcica was very large, as a result of the ventricular distension, not of any change in the pituitary body, which was simply flattened out.

Dr. Travers Smith said that Dr. O'Carroll deserved great credit for his diagnosis, as the diagnosis of chronic hydrocephalus was often very difficult in its early stages. He described a case which he believed to be chronic hydrocephalus in a girl aged eleven. She had a distressed, anxious expression, and was completely paraplegic. Knee-jerks were lost. Legs and practically the whole trunk were anæsthetic. Pupils were widely dilated. Pulse 60. He did a lumbar puncture, and the cerebro-spinal fluid came away in a strong stream. It was clear, and contained no micro-organisms and practically no cells. He presumed that Dr. O'Carroll's case was one of hyper-secretion of the ependyma, and he wondered if it had anything to do with the immature sexual organs, the condition of the skin and subcutaneous tissues.

Dr. Moorhead described a case of his own in which hydrocephalus had occurred after pyrexia, lasting for sixty days, in a man aged sixty-five. There was no obstruction to outflow, and there was increase of the sub-arachnoid fluid. The cerebro-spinal fluid was distinctly turbid, and he cultivated the *Bacillus coli communis* from it. He regarded the hydrocephalus as due to inflammation of the ependyma.

Dr. Neill also described a case in an infant, aged three weeks, from which he had removed twenty ounces of cerebro-spinal fluid through the occiput.

Dr. O'Carroll, in replying, said that although he had got no proof of syphilis in the case, he had perhaps suspected it as being the cause. He did not know whether the condition of the skin could be associated with pituitary mischief or not.

# ABDOMINAL TUBERCULOSIS IN ITS CLINICAL ASPECTS.

By JAMES LITTLE, M.D., F.R.C.P.I.;
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Regius Professor of Physic in the University of Dublin.

[Read in the Section of Pathology, February 16, 1906.]

By tuberculosis I understand the series of changes which are set up in living tissue when it has been invaded by the *Bacillus tuberculosis* of Koch. I look forward with great interest to the account of these changes which, I am sure, we shall receive from the distinguished pathologist who is to take part in this discussion. There are, however, a few elementary facts which we must bear in mind if we would understand the clinical phenomena which I will endeavour to describe.

Tuberculosis is a disease of the earlier periods of life. The changes which are produced appear to depend on three important factors, as yet imperfectly understood—namely, the virulence of the infection, which certainly varies; secondly, the amount of the infection which, judging by experiments on animals, is a matter of great importance; and, lastly, the varying susceptibility of the individual and of the different tissues of his body.

When the bacillus has obtained an entry it spreads by continuity, by entering the lymph channels or by entering the blood stream. The changes it produces are, first, a rapid multiplication of the cells of the part, followed, in the great majority of cases, by an equally rapid death of the part and escape of the bacillus. But at times a protective change occurs which hinders the escape of the bacillus and prevents further infection. If we knew the

circumstances which favour this protective change we would have acquired much valuable information to guide us in dealing with the disease.

I suppose there is no structure within the abdomen which may not be invaded by tubercle, but in the time at my disposal I must limit my observations to three associated structures—the peritoneum, the inner surface of the intestines, and the mesenteric and retro-peritoneal glands.

Tuberculosis of the kidneys and of the lower urinary tract is most important. Some of our views regarding it have undergone a change; but it is too large a subject for me to discuss, and, besides, falls to a certain extent into the domain of surgery.

Looking back on the cases of peritoneal tuberculosis which I have seen I can recall four quite distinct types.

In the first there existed an effusion of fluid free in the peritoneal sac. It was not as a rule large, and the cases presented the physical signs of moderate ascites. The diagnosis lay between ascites, due to cirrhosis of the liver, and the peritoneal effusion which sometimes accompanies malignant disease in the abdomen. From the latter it was to be distinguished by the age of the patient; from cirrhosis of the liver it was distinguished by the age and habits of the patient, by the presence of some fever, by the existence of more or less tenderness, and particularly by the colour of the urine, which in cirrhosis is invariably deep, while in tubercular peritonitis it is seldom more highly pigmented than the normal secretion. In these cases recovery may occur, even without surgical interference.

Many years ago a girl of about fifteen, of a typically tubercular appearance, was for months under my care in the hospital. She had a considerable peritoneal effusion, quite free to move, but never so great as to interfere with

her breathing or to necessitate tapping. This was before the period of surgical interference in such cases. She did not improve much, and ultimately went home, and I used to see her occasionally in the street, as she lived not far from the hospital. She then disappeared, but twenty years afterwards she came to the hospital to ask me to admit a child dying of tubercular meningitis, the offspring of her sister. She still looked delicate, but told me she had been able to get on fairly well since she had been in the hospital twenty years previously.

The second type of peritoneal tuberculosis is one of which I have seen a good many cases. In it there is a sacculated collection of serous or sero-purulent fluid. The effusion is limited by inflammatory adhesions between certain of the abdominal viscera. Over some spots in the abdomen a dull sound is elicited on percussion; over others, when we percuss over a coil of intestine, we get a resonant note. Some of these cases are liable to be mistaken for small ovarian tumours.

About ten years ago a young lady came to me because her abdomen was distended. The case appeared to me to be one of ovarian tumour, and I sent her to Sir William Smyly. I was present when he opened the abdomen. There was a sacculated collection of serous fluid, and the membrane was studded with tubercle. The girl made a good recovery, and five years afterwards was living and well in India.

The third variety of tubercular mischief in the peritoneum is not so frequent, but I have seen several cases of it. Masses varying in size from a filbert to a Tangerine orange are to be found in the abdomen. The patient usually gives a history of attacks of abdominal pain, vomiting, and constipation. If the abdomen is opened, masses, which manifestly consist of agglutinated tuber-

cular growths, are to be found in the walls of the intestine, in the omentum, and in the mesentery. Often there is extensive adhesion between the coils of intestine. When years ago I used to make the *post-mortem* examinations at the hospital I remember spending three hours endeavouring to unravel the abdominal contents of a young girl who had died of this form of tuberculosis.

The gravity of a case of this description greatly depends on whether there are these inflammatory agglutinations between coils of intestine. A patient on whom Mr. Heuston operated in the hospital last year had twice nearly lost his life in consequence of obstinate constipation with pain and vomiting probably due to some kinking of an agglutinated portion of the bowel.

If there are no adhesions the patient may get on very well.

Two years ago the manageress of a shop, a woman about forty, came to consult me for diarrhœa. She was a thin, spare, but active woman. I saw the motions, which were large, loose, frothy, and very offensive, but I found in her abdomen several tumours as large as small oranges, and she had many enlarged glands in her neck. Two years have passed, and although she has to take medicines continually to moderate the looseness of her bowels she is perfectly able to manage her business.

Lastly, we have localised patches of peritoneal adhesions, invariably, in my experience, due to tubercular mischief within the bowels. There may be effusion, but more frequently, I think, adhesions form over the ulcers which are within the intestine. The abdomen may be slightly distended, but is sometimes retracted. There are pain, fever, and, in consequence of the disease of the intestine, diarrhœa. In all these varieties we frequently have also pulmonary tuberculosis.

In the last variety to which I have alluded it is easy to understand how the peritoneum becomes infected through the bases of the ulcers within the intestine. In the other forms it is not so easy to understand how the peritoneum becomes infected. It can hardly be through the blood-stream, else we should have general tuberculosis and death. In women it may be through the Fallopian tubes, and it is quite possible, as has been suggested by more than one pathologist, that the infection takes place through the intestine without leaving any evidence of its presence on the mucous surface of the bowel.

The treatment of these cases, apart from measures for the improvement of the general health and the relief of special symptoms, must be entirely surgical.

Tubercular disease of the intestine is said to be generally a disease of childhood. I have seen far more cases in adults than in children, but this probably arises from the accidental circumstance that I see more adults than children. It consists in ulceration of the solitary and agminated glands in the lower end of the ileum. The ulcers are not usually large or numerous; they have overhanging edges and indurated bases, and tend to encircle the bowel. They usually set up chronic enteric catarrh. It is said that this form of tuberculosis is seldom met with except in those who suffer from pulmonary tuberculosis. It is believed, and probably with truth, that it is set up by swallowing the infective secretion from the cavities in the lungs. Every phthisical patient, I suppose, swallows some of the mucus and pus which are formed in his lungs, but it is only those who usually refrain from spitting whose intestines become infected. It has been shown experimentally that a small quantity of tuberculous material may be introduced into the stomach of susceptible animals without injury, but that if a large

quantity is introduced the animal is rendered tuberculous. I have myself seen only a few cases of intestinal tuberculosis in which disease was not also to be detected in the lungs; but I have seen a few.

A well-known gentleman, living near Dublin, was for many years a patient of mine suffering from undoubted tubercular diarrhœa. He had no lung disease, but had been crippled in early life by tubercular mischief in his left hip joint. When I say that there is sometimes no disease in the lungs, I should rather say that there is no discoverable disease in the lungs. It is a curious fact that if there is tubercular disease both in the lungs and in the bowels the symptoms of the pulmonary malady will abate when those of the intestinal disease are strongly in evidence, and, what is still more extraordinary, the physical signs of the lung disease may be more difficult to discover. Precisely the same thing occurs in women who are pregnant, and who have pulmonary consumption.

If asked to give an opinion regarding the chest of a woman a week or two before her confinement it is very unwise to say positively that she has no disease in her lungs, because one is not able to discover the physical signs. They may be detected with ease a very few days after her labour.

The great symptom of tuberculosis of the bowels is diarrhœa. Though no drug is given, it will sometimes abate for a day to recur with violence. The stools are copious, light-coloured, very offensive, and generally frothy. The action of the bowels is provoked by taking food, and especially if exercise is taken after a meal. There is usually a little blood at times in the motions, there is colicky pain, and there is fever.

It is said that when you have disease both of the lungs and of the intestines recovery never takes place, and

perhaps this is true, but hopefulness is the essence of a physician, and I have seen a few patients who, with limited disease of their lungs and considerable signs of disease of the bowels, yet made an apparently good recovery, though they were always afterwards invalids.

Apart from the general management of tuberculosis, of which I will say a few words presently, the special treatment of tubercular disease of the bowels is by diet and rest. Broths always aggravate the diarrhœa, and so do all foods which are not in great part digested and absorbed before they reach the ileum. Small meals, consisting of eggs, cream, custard, white fish, and, above all, raw meat, should be given. I have for many years used raw meat greatly for children. Long enough kept to be tender, shred very fine, and mixed with red currant jelly or port wine, it is relished.

There is a danger, which, however, is well worth running, of giving the child tape-worm if he is fed on uncooked meat. This has occurred twice in my own experience. The patient should abstain from exertion for an hour or more after a meal. Warmth is very important, and with this object a flannel binder should be worn over the abdomen. I have also found the greatest benefit from the wet pack, which I have used for many years. A calico pad, six or eight folds in thickness, is wrung thoroughly out of cold water and laid upon the abdomen at night. Over this a sheet of protective is spread, and all is firmly bandaged. Of internal remedies probably the one now most used, and one of the most efficacious, is salicylate of bismuth, which I first saw prescribed many years ago by Sir William Broadbent. I think it is usually not given in sufficient doses.

In November last, when temporarily absent, I left a hospital patient of mine, who was very ill with tubercular

diarrhœa, under Dr. Bewley's care, and he ordered teaspoonful doses of salicylate of bismuth in a wineglass of warm milk with excellent effect. Another combination which I learnt from Dr. Hudson is a pill containing a quarter of a grain of carbolic acid, a quarter of a grain of opium, and three grains of trisnitrate of bismuth. The old chalk mixture, with laudanum and catechu, is an excellent remedy, and there is also one which I would like to mention, which I learned from Sir George Porter, and which has now been almost forgotten by the profession. Sir George used to order an ounce of tormentilla root to be boiled in a pint of milk, and a wineglassful to be given to a child two or three times a day. Sometimes he added to each dose a teaspoonful of the preparation of eucalyptus gum, which goes by the name of the *Syrupus gummi rubri.*

As I have already implied, it is not desirable to entirely stop the diarrhœa when there also exists pulmonary trouble.

Tubercular disease of the mesenteric glands is undoubtedly sometimes met with without any discoverable tuberculous lesion within the intestine. It is indicated by a tumid abdomen; the child does not thrive, and the motions from the bowels are large, light-coloured, and offensive. In children who are so affected, and where there is no intestinal trouble, I have long relied on a combination which appears to me very beneficial. It consists of hydrochloric acid with perchloride of mercury in doses suitable to the age of the patient.

Apart from the remedies I have mentioned to meet special symptoms, those who suffer from abdominal tuberculosis should have the care which has come so much into vogue for cases of pulmonary phthisis. They should live in high and dry situations. Sunshine is their best friend.

They should have abundance of pure fresh air with very little exertion. Their food should be as ample as they can digest, and they generally need a moderate quantity of alcohol, which seems to promote appetite, help digestion, and lessen fever.

Of the various tonic medicines which are thought to be useful against tuberculosis I have little faith in any except hydrochloric acid, which the late Dr. Hudson used to say was far superior in tuberculosis to cod-liver oil. Creosote is also, I think, useful, not for any specific effect upon the bacillus, but because of its power of lessening fermentative changes in the stomach.

I fear, however, that if we were to speak candidly to a tuberculous patient we should be obliged to say what the American lecturer said when invited to give an address to the undergraduates of Yale College on the points to which they must carefully attend if they wished to have a happy and a successful career—"Young gentlemen, if you wish to have a long and prosperous life, the first thing about which you should be very careful is your ancestors."

# TUBERCULOSIS OF THE FEMALE GENITAL ORGANS.

By SIR WILLIAM SMYLY, M.D. Univ. Dubl.;
President of the Royal College of Physicians of Ireland.

[Read in the Section of Pathology, February 16, 1905.]

Although tubercular disease of the female genital organs has long been familiar to pathologists, it is only within comparatively recent times that it has attracted the attention of gynæcologists, because until abdominal section and the frequent use of the curette and microscope came into vogue we were without the means of making a diagnosis during life.

It is now known that every part of the female genital canal as well as the ovaries are liable to become the seat of this disease. The Fallopian tubes are by far the most frequently affected portion, the uterus fairly often, the other parts rarely.

The frequency with which this disease is likely to be encountered in a given number of cases is difficult to determine, because published statistics vary immensely according to the care with which the material has been handled. If we take, for example, those collected by A. Martin, in his work on the diseases of the tubes, we find that von Winckel met with 182 examples of tubal disease amongst 575 autopsies on female subjects, of which five were tubercular. In like manner, Schramm reported 34 examples of tubercular tubes out of 3,386 female cadavers, which is about the same proportion of 1 per cent. Dönhoff, on the other hand, was able to detect the disease fourteen times in 509 female subjects, or nearly 3 per cent.

The results obtained by the examination of specimens removed by operation show even a more marked diversity. Thus, Martin 17 amongst 620 salpingotomies, or 2.7 per cent.; von Rosthorn, 5 per cent. Whitridge Williams found amongst the tubes removed in the Johns Hopkins Hospital during two years that 8 per cent. were tubercular. Menge examined twenty cases of pyosalpinx, and found by inoculation of animals and culture experiments that three were tubercular, or 15 per cent.

Whitridge Williams calls attention to the fact that out of eight of the cases found to be tubercular in Johns Hopkins Hospital only two were recognised as such at the time of operation, and that the other six would have escaped observation had it not been for the routine microscopic examination. As to the relative frequency with which the organs are affected, he estimates that the tubes are always involved, the uterus in 65 per cent. and the ovaries in about 40 per cent.

The manner in which the bacilli find their way to the female genital organs is more or less a matter of conjecture. They may do so in the blood, or by continuity of surface, either from the peritoneum or the uterus. Free bacilli might also pass from the peritoneal cavity into the tube just as the ovum does. It has been thought that they might also be introduced from below by coitus with males suffering from tubercle, and this opinion, which has been urged by Martin, Menge, Pozzi, and others, is supported by the fact that the disease occurs most frequently during the childbearing period of life, and also by the fact that the bacilli have been found in the seminal fluid of tubercular men. It has been urged against it, however, that it is highly improbable that the bacilli, which possess no power of progression, could possibly pass through the uterus and tube to the ampulla, which is the part most

frequently affected; nor is it probable that they could be conveyed there by spermatozoa, because the lively movements of the latter would most certainly wipe them off. Lastly, the disease might be propagated from neighbouring organs.

*Vulva.*—Tuberculosis of the vulva has hitherto been observed only in the form of an ulcer, and never as a primary affection. It is very rare, and but few cases have been reported.

*Vaginal tuberculosis* is also a rare affection, and is usually secondary to uterine, but two cases have been recorded as primary, one by Thompson and the other by Friedländer, but the former is doubtful. The disease occurs as a greyish caseating ulcer on the posterior wall, with irregular sharply-defined margins, and surrounded by reddened infiltrated mucous membrane, in which miliary tubercles may be seen.

*Uterine tuberculosis* is a fairly frequent disease of the body of the uterus, but is rarely found in the cervix. It commences in the endometrium, a miliary tuberculosis being the initial lesion. But the disease is seldom discovered until it has advanced to caseation and ulceration. The interior of the uterus may be filled with caseous material, and where the os is occluded pyometra may result. As the disease advances the muscular tissue becomes involved and hypertrophied, leading to considerable enlargement of the organ.

A very interesting subject is the occurrence of tubercle in the mucous membrane of the pregnant uterus. Schmoel and Kochel found in a phthisical woman, who died four days after delivery, caseating tubercle involving almost the entire decidua, and in the infant, which died on the twelfth day, complete caseation of the suprarenal bodies. Westenhofer found a small tuberculous infiltration of the

endometrium in a patient who had died of acute miliary tuberculosis after a five months' abortion, and Runge tuberculosis of the decidua basalis in a woman who died of the disease in the fourth month of pregnancy. It is certain, therefore, that both in acute and also in chronic phthisis a localisation may take place in the endometrium, but it is uncertain whether the ovum was implanted upon a diseased membrane or whether the latter became diseased subsequently, though the latter is more probable.

The probability of the fœtus being infected with tubercle by the mother had been suggested by many authorities, but the fact that this actually occurred was first demonstrated by Schmoel and Birch-Hirschfeld, who found in a fœtus which had been removed by Cæsarean section from a woman who had died of miliary tuberculosis, tubercle bacilli in the vessels of the umbilical cord and in the capillaries of the liver. A tubercular infiltration was also discovered in the placenta. Thiercelin and Londe found advanced tuberculosis of the liver, spleen, and kidneys of a four-day-old child whose mother was tuberculous; and Lehmann found all the evidences of tuberculosis, excepting the bacilli, in a placenta involving the decidua basalis and chorionic villi.

It is remarkable, however, considering the vast number of tubercular mothers, that so few cases of fœtal infection should have been reported, and it would appear, therefore, that in general the placenta acts as an efficient and impermeable filter for tubercle bacilli, or that the unborn child affords an unfavourable soil for their development.

*Tubal tuberculosis* occurs in an acute and a chronic form, both tubes being as a rule affected. In the latter the tubes are enlarged and twisted, feel hard and noduled; the ends become closed, and a pyosalpinx forms. The contents may be fluid, thick or cheesy. The micro-

scopic appearances resemble those produced by tubercle in other parts. In the acute form there is a proliferation of round cells mixed with tubercle, but few giant cells, and the mucous membrane rapidly degenerates into a detritus mass. In the chronic form there is a development of tubercles which caseate slowly, the epithelium is shed, and the folds of mucous membrane grow together, often forming retention cysts. The muscular coat is greatly thickened by inflammation and development of fibrous tissue. The peritoneal covering is often studded with numerous tubercles; giant cells are formed, but very few bacilli.

*The symptoms* produced by genital tuberculosis in the female are those usually met with in inflammation of these organs—namely, pain, leucorrhœa, and irregularities of menstruation, but they present no peculiar features by which a diagnosis could be formed.

*Physical signs.*—Almost the same must be admitted with regard to the objective signs. The appearance of tubercular ulcers of the vulva and vagina are, of course, characteristic, and the microscopic examination of the discharges and of particles removed by the curette will establish a certain diagnosis in uterine cases. But where, as is most usually the case, the disease is situated in the tubes, a probability of the conditions being of a tubercular nature is the nearest that we can get to a diagnosis until the parts have been removed and examined by a pathologist.

In endeavouring to arrive at a clinical diagnosis, the history of the case, the presence of the disease in other organs, the general condition of the patient, and the presence of ascites are important. There is nothing peculiar about the shape of the distended tubes, although a peculiar thickening of the uterine end (salpingitis isthmica

nodosa), to which importance has been attached by Hegar, is much more common in tubercular than in other forms of sactosalpinx. And lastly, and especially if, in addition to the foregoing signs, nodular thickenings are plainly to be felt on the folds of Douglas, the condition present may be assumed to be very probably, but by no means certainly, of a tubercular nature.

As regards treatment in its early stages, the disease may be treated constitutionally, but in all advanced cases the total removal of the organs involved is the only rational procedure, but such operations are amongst the most difficult and dangerous in surgery, because the disease is often found to have implicated neighbouring organs, and so intestinal and urinary lesions of an incurable nature are not infrequently encountered, and the unfortunate patient is left to the horrors of a life-long urinary or fæcal fistula.

# SOME POINTS IN THE PATHOLOGY OF ABDOMINAL TUBERCULOSIS.

By EDMOND J. McWEENEY, M.A., M.D. R.U.I., F.R.C.P.I.;
Pathologist to the Mater Misericordiæ Hospital, Dublin;
Professor of Pathology and Bacteriology, Catholic University, Dublin.

[Read in the Section of Pathology, February 16, 1906.]

In the time allotted it is difficult to deal adequately with any one aspect of so vast a subject as abdominal tuberculosis. I shall begin by stating my own experience on some points to which my attention has been frequently directed, and then, should time allow, I propose to sum up the conclusions to which recent investigation seems to be leading us in this department. My own experience is far from being as extensive as it ought to be, considering the number of autopsies which I perform. This is because at the hospitals with which I am connected we rarely—save in the acute miliary variety—see the end of tubercular cases. I shall sum up my experience of urine-examination in tuberculous disease of the genito-urinary tract by saying that, roughly speaking, I find the tubercle bacillus present in about four-fifths of the cases in which purulent urine is passed with a distinctly acid reaction. They are usually found quite readily in the centrifugal sediment, needing no special device for their detection. They are nearly always agglutinated. This I would ascribe to the saline concentration of the urine. Since we have begun to concern ourselves with opsonic indices we have learnt that "normal" and more highly concentrated saline solutions agglutinate the tubercle bacillus. The pus of tuberculous urine is composed, not of mono- but of poly-nuclear leucocytes—

contrary to what one might expect from the fact that in the tissues the tubercle bacillus seems to exercise little or no attractive influence on the polynuclear variety. The prevailingly polynuclear character of the pus in tuberculous urine I would account for by supposing that not only are the bacilli agglutinated but that some of them are plasmolysed, and their protein contents diffusing out into the tissues exercise their well-known attractive influence on the polynuclear elements.

I shall next refer to a peculiar variety of tuberculous lesion of the bowel, which I shall call hypertrophic tuberculosis. It occurs chiefly in the ileo-cæcal region, but may, as in the specimen I now exhibit, extend up to the hepatic flexure or even beyond it. The lumen is stenosed and the walls are excessively thickened by a hypertrophy of the intrinsic muscle and by dense infiltration with embryonic cells which leads to a remarkable new formation of fibrous or fibro-adipose tissue. The resemblance to cancer is quite remarkable, and would mislead even an experienced pathologist. The mucous aspect of the bowel is ulcerated, and presents polypoid or papilliform projections. On microscopic examination the ulcerated surface presents no trace of the glandular layer, but is covered with a layer of granulation tissue the cells of which are mostly mononuclear. Scattered or in groups throughout this tissue are astonishing numbers of tubercle bacilli, many being intracellular. There is here no evidence of either caseation or tubercular structure, but towards the serous aspect typical tubercles may be present. All these points can be made out under the several microscopes which I have placed in position. The anatomy of this variety of intestinal tubercle is thus seen to be absolutely distinct from the ordinary tubercular ulceration of the bowel met with in consumptives who have swallowed their sputum, and I

should be inclined with diffidence to account for the difference on the supposition that the hypertrophic form, tending as it does to cell proliferation rather than to cell death, is caused by *slightly virulent bacilli of bovine type.* Since Koch's famous pronouncement on this subject in July, 1901, an enormous amount of work has been done, not only by private investigators but by Government Commissions appointed *ad hoc*, more especially in England, Germany, and the United States. I may sum up the general impression left upon my mind by such of that work as has come to my knowledge, more particularly by the experimental results brought forward at the Tuberculosis Congress held in Paris last October, by saying that so much of Koch's position as is based upon the non-virulence of bovine tubercle for the human race seems to me in the light of recent research to be untenable. Not only do the results of the English Commission seem to point that way but also those obtained in America by Ravenel seem conclusive against Koch's view. Great importance must, moreover, be accorded to the results of the German Governmental Commission, manned as it is by personal friends of Koch and members of his school under the leadership of that eminent bacteriologist, Prof. Kossel. Out of some fifty cases of human tuberculosis which this Commission investigated they found bacilli of bovine type in six, all of which appeared to be of alimentary origin, and two of which were cases of generalised miliary tuberculosis. This proves that the most virulent type of the disease may be occasioned in the human race by bacilli derived from the cow, unless indeed we prefer to assume, as certain almost superstitious believers in Koch actually do, that these cases were mixed infections—the intestinal affection being due to bovine, and the generalised miliary element to human tubercle bacilli! So much for the moment

about Koch's denial of virulence (as regards the human subject) to bovine bacilli. The other portion of his dictum—viz., that human tubercle is overwhelmingly respiratory in origin—has been vehemently called in question by von Behring, who has warmly championed the alimentary origin of the disease. He bases his view on the observed fact that anti-toxins, which are bodies consisting of molecules too large to pass through the intestinal wall of adults, are absorbed unchanged by young animals. He found, moreover, that large bacilli, such as those of anthrax, can pass unaltered through the intestinal epithelium of sucklings. From this and other considerations based on the statistical prevalence of tuberculosis, which time does not permit me to enter on now, von Behring draws a conclusion the very opposite to that of Koch—viz., that infection with tubercle nearly always occurs during infancy, and is due to the *ingestion* of bacilli.

Behring's view failed to meet with acceptance from the most experienced clinicians. Yet it has within the last few months received confirmation from an unexpected quarter—the school of Pasteur. Calmette, who is Director of the Pasteur Institute at Lille, and well known for his researches on snake venom, finds that kids which have imbibed the milk of udders that have been artificially infected with tubercle bacilli gradually waste away, and after death are found to have enormous foci of disease in the mesenteric glands as a rule, but *exceptionally pulmonary tuberculosis develops without obvious lesion of the gastro-intestinal mucosa or of the glands.* By a study of the effects of introducing cultures of virulent bacilli into the *rumen* of *adult* goats, Calmette was led to conclude that in adult animals, owing to greater permeability of the mesenteric filter, pulmonary tuberculosis is the *usual*

result of gastric infection, and he even goes so far as to attribute the fresh outcrop of tubercles so often seen round older lesions in the lungs of consumptives to absorption of swallowed bacilli and their entrance into the blood current *viâ* the thoracic duct. Calmette concludes that adults are more prone to lung-infection by the intestinal route than are children, and that consumptives should be warned against the danger of swallowing their expectoration, and should be instructed in the hygiene of the mouth.

Two of Calmette's pupils tested the effect of introducing finely-divided inert pigment into the gastro-intestinal tract of animals, and found that in sucklings it was stopped in the mesenteric glands, whilst in adults it passed through these and was at once deposited in the lungs. They came to the conclusion that pulmonary anthracosis is mainly due not to *inhaled* but to *swallowed* carbon. The pendulum has thus swung round again to a belief in the danger of alimentary infection, and the tendency of the instructed legislator will, therefore, be not only not to relax but to increase the stringency of regulations made with a view to its prevention.

# THE SURGICAL ASPECT OF ABDOMINAL TUBERCULOSIS.

By T. E. GORDON, F.R.C.S;
Surgeon to the Adelaide Hospital, Dublin.

[Read in the Section of Pathology, February 16, 1906.]

During the few minutes at my disposal I will endeavour to show what are the limits of surgery in the treatment of abdominal tuberculosis and to show what I think are likely to be some of the changes which will be effected by the new tuberculin treatment.

I cannot imagine any surgeon, at the present time, selecting abdominal tuberculosis as a subject for general discussion. We have few triumphs to record, and I am not aware of any remarkable advance which has been made during the last few years. It is only in its relation to the tuberculin treatment that the surgical aspect is likely to interest the meeting.

Tubercular peritonitis may for my present purpose be simply divided into an ascitic and a fibrous form. The latter includes many varieties, but they merge into one another. I have not myself met with a case of fibrous form in which there was not some evidence of caseation or chronic abscess formation. It is matter of common knowledge that the results of simple laparotomy as a treatment for the ascitic form are generally good, but they are not invariably so. I recollect a case of what I may almost call acute peritoneal tuberculosis, for the history was short, and the patient, a little girl, had a temperature sometimes reaching 103°. Laparotomy in that case was a signal failure. But apart from such exceptional cases as

this the results of surgical treatment in the ascitic form are undoubtedly good.

It is otherwise with the fibrous form. It is difficult to believe that an operation can benefit cases in this group except those in which there is a localised chronic abscess; and even here I think it most unlikely that a cure will be effected by surgery, *per se*. It is more likely that the disease will continue active and an incurable intestinal fistula form.

I may incidentally remark that such chronic abscesses are not very uncommonly a source of diagnostic error. I have known them mistaken for sarcoma, and I have also met with the reverse mistake. A determination of the opsonic index will doubtless enable us to avoid such mistakes in future.

A cure appears to have followed operation in a few very hopeless-looking cases of general fibrous and caseating tuberculosis, but it seems more reasonable to suppose that such cure was *post hoc*. In a general way so unsatisfactory are the results, so real the danger of operation eventuating in fistula, that a surgeon, in my opinion, would be fully justified in refusing to interfere.

Now, what results can we reasonably hope may be effected by Wright's treatment? As bearing upon this let me read you the account of a case treated by injection of tuberculin (without reference to the opsonic index) by my colleague, Mr. L. G. Gunn.

L. N., aged twenty-one, unmarried. Four years before admission patient had a tubercular toe removed. Up to May, 1905, she had menstruated regularly every month. In May she got a feverish attack, said to be influenza. From this time on the menses ceased and the lower part of her abdomen began to swell rapidly. She was admitted to the Adelaide Hospital on July 21st. There was then a swelling the size of a six months' pregnancy in and rising out of the pelvis. A small uterus could be felt in

front of this tumour, which was thought to be possibly ovarian. Her temperature was hectic—about 103° at night. Her condition very bad when, on August 2nd, her abdomen was opened by Sir William Smyly. The tumour was adherent to the abdominal wall, and was opened. A quantity of tubercular pus flowed out. It was impossible to make out with certainty the origin of the abscess, whether the ovary, the tube, or in connection with the intestine, or a mesenteric gland. The girl's extremely bad condition precluded any attempt at an extensive operation. In consequence, the cavity was merely packed with gauze after a thorough washing out. Quantities of pus kept discharging from the wound. Her temperature still hectic, as a rule rising to 102° or 103° at night. Strength did not return, and wasting continued until, at the end of nine weeks, her condition was about as bad as it could well be. Injections of Koch's "new tuberculin" were then begun, and twenty-two injections given, beginning with the $\frac{1}{500}$ of a milligram and rising to $1\frac{1}{2}$ milligrams. The tuberculin was given as a rule every second day. The dose increased if there had been no rise of temperature after the preceding inoculation. Almost at once improvement began to show itself—the night temperature lower, the amount of discharge much less, her appetite improved, and she began to put on flesh. On November 17th she and a medical patient on the same landing suddenly developed diphtheria. In consequence of this, tuberculin treatment was stopped for four weeks. During this time the discharge became much worse, and temperature began to rise again. On December 16th the injections were begun again, and after four inoculations of $\frac{1}{2}$ a milligram the discharge almost ceased and the temperature came down to normal. During the next three weeks $\frac{1}{500}$ of a milligram was given once a week. She was then sent out to the Convalescent Home. She returned after a fortnight; the wound was quite healed, she was back to her normal weight, and able to walk about a little without being tired. She was given a final $\frac{1}{500}$ of a milligram, and sent home to the country.

This result is convincing, and we may reasonably look forward to many similar successes by the more precise method of Wright. But here I wish to ask an important

question. Are we correct in describing such a result as a cure? I think not, for the fibrous deformity of intestine and peritoneum remains. In cases of localised abscess such deformity may not do any harm, but where the disease is extensive, where the intestines are extensively matted together by fibrous tissue, the cure of the tubercular element would still leave the patient to suffer from one of the most troublesome of abdominal affections—a condition which frequently causes distressing symptoms, and which may even prove fatal by inducing an intestinal obstruction.

### TUBERCULOUS GROWTHS IN WALL OF INTESTINE.

I now refer to a class of case which I think is rather uncommon. In these the disease originating as a tubercular ulcer gives rise to much fibrous overgrowth, so as to suggest to the naked eye a true tumour of malignant type. It has its chief importance as a cause of obstruction. There are three principal methods of operating for these conditions—*i.e.*, complete excision, short circuiting, and occlusion. It is rarely that the local conditions allow of complete excision, though occasionally a brilliant operation has been performed with success. Short circuiting, of course only palliative in its aim, is the usual procedure. I recollect eight or ten years ago a case of chronic obstruction in an old man who had also chronic phthisis. I found two tumour-like masses in his lower ileum. I made a lateral anastomosis, joining together healthy intestine above and below these masses. The man was relieved for a time, but after some months he again came under my care with a return of obstructive symptoms and an increase in cough. He died, and at the autopsy we found five distinct tuberculous masses in parts of the small intestine far remote from one another. This was a specially

unfortunate person, but ultimate recovery is unlikely to follow a short circuiting operation under any conditions.

It is clear that tuberculin treatment can never replace surgery in such cases as these, but it seems possible that by its use as an after-treatment what was only palliative may become curative.

Of the rarer forms of tubercular disease of the alimentary tract I have but little to say. I have never met with an example of tubercular appendicitis, and it is certainly very uncommon, though we know it may occur. We have had a case of what was almost certainly tubercular disease of the stomach at the Adelaide Hospital. This is of course also a rare event, but I am inclined to think that some of those cases of chronic ulcer which we now not very uncommonly see in the operating theatres, in which there is much thickening round the ulcer, may possibly be of a tubercular nature. At all events, I would suggest the advisableness of not assuming that they are of a simple nature.

Now I shall only ask you to allow me to summarise. We surgeons meet with tuberculosis more or less often in every part of the alimentary tract from the tip of the tongue to the anus. The cases which we are able to cure by operation are few. Our best results are in cases of ascitic tubercular peritonitis, but even in these I think the degree of success is less than is generally stated. The result of operation in the fibrous form is almost uniformly bad.

Where tubercular disease causes chronic obstruction the operation performed is, as a rule, but palliative.

Looking forward, we may with reason hope for better results, aided by tuberculin. Still it seems improbable that here the new treatment will have its greatest triumph, for neither in fibrous peritonitis nor in intestinal obstruction can it be expected to remove the mechanical disablement caused by the tubercular disease.

# THE OPSONIC INDEX IN RELATION TO TUBERCULAR PERITONITIS.

By ARTHUR H. WHITE,

Professor of Pathology, Royal College of Surgeons in Ireland;
Pathologist to the Meath Hospital and to Cork Street Fever Hospital.

[Read during the discussion on Abdominal and Pelvic Tuberculosis in the Section of Pathology, on February 16, 1906.]

A. E. WRIGHT has shown that there is present in the blood a protective substance hitherto unknown, which he calls *opsonin*, to the presence of which phagocytosis is largely due. He has also shown that the blood in cases of local tuberculosis contains less *opsonin* than the blood of normal people—that it to say, that the opsonic index is lower than normal, and, further, that the amount of opsonin may be increased, or, in other words, the opsonic index may be raised, by the inoculation of a tubercle vaccine. He has demonstrated how such inoculations are to be made with the best results, and how the maximal degree of immunity may be obtained by minute doses given at intervals determined by the study of the opsonic index. He proved by the marvellous results of treatment conducted on such lines that in raising the opsonic index and keeping it steadily at the normal, or at a higher, level by suitably interspaced inoculations improvement and ultimately complete cure of local tuberculosis results.

It is recognised by physicians, and occasionally even by pathologists, that the surgeon cures some cases of tuberculous peritonitis by washing out the peritoneal cavity. Like many instances in which empirical treatment has been adopted, no adequate explanation could be furnished. My object now is to show how Wright's work explains why

such cases get well and why so many similar cases improve for a time and subsequently relapse.

The operation of opening and washing out the abdomen of a patient suffering from tuberculous peritonitis does two things. In the first place, it gets rid of the fluids which bathe the local lesions, and which are relatively poor as compared with the blood in opsonin, so that after the operation these fluids are, through the necessary subsequent exchange which occurs between the blood and the locally infected area, replaced by fresh fluids containing a relatively larger amount of opsonin and other protective substances. The results set forth in Table I. fully support both portions of this statement. The second great effect of the operation, which is partly shown in the latter examples given in Table I., and well shown by Table II., is that, generally speaking, a rise in the opsonic index of the blood results. This is due to the auto-inoculation which takes place in part as a consequence of the disturbance of the infected area,[a] and in part because during the exchange already referred to, which occurs between the tuberculous area and the blood, bacterial products from the former are probably carried into the general circulation. From such auto-inoculations effects result similar to those obtained by the inoculation of tubercle vaccine. Should the dose be large a fall in the index occurs—*i.e.*, a "negative phase" results—and this in turn is followed by a rise which lasts for a variable period. On the other hand, should the dose be a small one, there may be no negative phase, but an immediate rise, as in the case of the inoculation of a small dose of tubercle vaccine. Taking the opsonic index as a measure—it may be only a rough one—of the immunising influences at work, the truth of Wright's statement, that cure is effected in those cases of

[a] Massage of a tuberculous focus produces a rise in the opsonic index.

local tuberculosis when the index is raised and steadily maintained for a sufficient period at a high level, can readily be accepted. The study of results given in Table II., which sets forth the effect of operation on the opsonic index of a number of cases, shows that after operation there is sometimes a negative phase which is followed by a rise; that sometimes the rise is immediate, and that the period during which the rise is maintained is variable. Clinically, those cases (*e.g.*, S. C. and D. R.) with a rising index were cases which improved, and those with an index which fell or did not rise (*e.g.*, F. S. and P. G.) were cases which improved but slightly or not at all. Hence one can conclude that certain cases of tuberculous peritonitis get quite well because a high index is maintained for a sufficiently long period, and that relapses occur in other cases because the index falls long before the period necessary for the *opsonin* and other protective subtances to destroy the bacilli. Such cases simply improve during the time of the high index, and then, when the quantity of opsonin diminishes to the low level natural to the patient, relapse occurs (see Table III.).

In the event of this explanation proving true, and knowing that it is possible to raise and maintain the opsonic index at a high level by suitably interspaced inoculations, the question may be asked: "Are operations to be performed in future in such cases?" I certainly think so, as they furnish the only or best means of getting rid of the fluid poor in opsonin and promoting the necessary exchange. It must, however, be borne in mind that the raising of the opsonic index before operation by inoculation will give a replacing fluid for the local lesion richer in opsonin, and, at the same time, enable the patient to withstand better the "negative phase" portion of the probable auto-inoculation which will result from the operation. Then

again, as relapses frequently occur, the after-treatment should include occasional blood examinations to determine when the opsonic index begins to fall, and from that time on suitable inoculations, properly interspaced, should be given until the patient's local condition quite heals.

Table I.

| | Opsonic Index. |
|---|---|
| F. S. Tuberculous Peritonitis— | |
| Blood serum | .80 |
| Peritoneal fluid | .61 |
| F. G. Tuberculous Peritonitis and Pulmonary Phthisis— | |
| Blood serum | 1.22 |
| Peritoneal fluid | .95 |
| S. M. Tuberculous Peritonitis— | |
| Blood serum | .53 |
| Peritoneal fluid | .28 |
| P. G. Tuberculous Abscess (First Evacuation)— | |
| Blood serum | .38 |
| Pus serum | .08 |
| (Second Evacuation, 17 days later)— | |
| Blood serum | .72 |
| Pus serum | .57 |
| D. R. Tuberculous Abscess (First Evacuation)— | |
| Blood serum | .33 |
| Pus serum | .04 |
| (Second Evacuation, 7 days later)— | |
| Blood serum | .62 |
| Pus serum | .57 |

Table II.

| | Opsonic Index of Blood. |
|---|---|
| D. B. Tuberculous Glands removed— | |
| 14 days after operation | 1. |
| 24 ,, ,, | 1.12 |
| 31 ,, ,, | .44* |
| 34 ,, ,, | .40 |

*Immediately before this the wound, which had not healed, became ulcerative in character and two other glands enlarged. Subsequently these glands disappeared again, and the whole wound healed under treatment with tubercle vaccine.

| | Opsonic Index of Blood. |
|---|---|
| L. M. Tubercular Kidney removed— | |
| 45 days after operation | 1.24 |
| 52 „ „ | .97 |
| 59 „ „ | 1.07 |
| 66 „ „ | 1.07 |
| 69 „ „ | .79 |
| 73 „ „ | .82 |
| F. Tubercular Glands removed— | |
| 3 weeks after operation | 1.25 |
| S. C. Excision of Tuberculous Ribs— | |
| 2 days after operation | .70 |
| 7 „ „ | .93 |
| 14 „ „ | 1.20 |
| 18 „ „ | 1.22 |
| P. G. Tuberculous Hip— | |
| Day abscess was evacuated | .38 |
| 3 days after evacuation | .65 |
| 7 „ „ | .38 |
| 10 „ „ | .50 |
| 14 „ „ | .34 |
| D. R. Tuberculous Abscess from Spine— | |
| Day abscess was evacuated | .33 |
| 3 days after evacuation | .22 |
| 7 „ „ | .62 |
| 10 „ „ | .73 |
| 14 „ „ | 1.03 |
| 17 „ „ | 1.08 |
| 21 „ „ | 1.31 |
| 24 „ „ | 1.39 |
| 28 „ „ | .81 |
| F. S. Tuberculous Peritonitis— | |
| Day of operation | .80 |
| 5 days after operation | 1.03 |
| 9 „ „ | .93 |
| 12 „ „ | .70 |
| 16 „ „ | .48 |

Table III.

Cases of Tuberculous Peritonitis which had been operated on and which relapsed.

| | | Opsonic Index of Blood |
|---|---|---|
| J. M.—Operated on | 1½ years previously | .80 |
| J. M'K. „ | 9 months previously | .50 |
| B. D. „ | 11 „ „ | .53 |
| J. H. „ | 12 „ „ | .50 |

Note.—The opsonic index, in a case which appeared to be perfectly well as the result of an operation two years previously, was 1.2.

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Dr. Parsons drew attention to the occurrence of tuberculosis in hernial sacs, and said he had a patient suffering from that affection who showed no signs of abdominal tuberculosis. He saw recently an account given by Dr. Carmichael of 154 cases of hernia in children. Four of these were tubercular, and in one of the four there was found general infection of the abdominal cavity.

Dr. Coleman said he thought that both the diagnosis and treatment of local tuberculosis had been placed on a very satisfactory footing by Wright's method. For some time past he had been treating local forms of tuberculosis with promising results by giving tubercle vaccine controlled by determination of the opsonic index. Wright had treated severe cases of tubercular peritonitis with success. That treatment, however, was not suited for every case.

Dr. Purefoy said he saw tubercular conditions of the genital tract in two puerperal cases. Both patients died a few weeks after delivery of advanced pulmonary phthisis. One of these had borne several children. In her case he found projections, like yellow pustules, on the posterior vaginal wall. One case of tubercular nodules on the uterine end of the Fallopian tube has been reported.

Sir Thornley Stoker said that Dr. Coleman seemed to be curing by Wright's method patients that he had failed to benefit by operation. Two years ago a patient came to the Richmond Hospital with a tumour in her right iliac region. He explored it, after incision, and found a hypertrophic tubercular mass in

the ascending colon, which he removed. The patient never got a rise of temperature, and left the hospital well.

Mr. J. M'Ardle said, in reference to tuberculosis in a hernial sac, that, where a hernia had been present for some time, the intestinal wall was weakened, and it was this condition that allowed the tubercle bacilli to permeate it. As to the possibilities of the tuberculin treatment, we were now employing no haphazard method. He did not think, however, that we had yet got a panacea for the lesions caused by the tubercle bacillus.

Dr. Travers Smith said that in his clinical experience diarrhœa was not a constant symptom of tubercular ulceration of the intestine. Dr. Earl made a *post-mortem* examination of a boy, aged fourteen, who died from pulmonary tuberculosis, whose large and small intestine were extensively ulcerated. He also expressed surprise at Professor McWeeney's statement that ninety per cent. of acid urines containing pus were tubercular.

Mr. E. H. Taylor mentioned the case of a man who came to hospital about a fortnight ago with pain in the abdomen and swelling in the right side. Opening the abdomen he found a tumour as big as an orange in the ascending colon, above the cæcum. The muscular coat of the ileum was hypertrophied, and some of the neighbouring glands were caseating. He regarded it as tubercular. After operation the patient got well.

Dr. Moorhead spoke of a case of hypertrophic tuberculosis of the cæcum, which had been remedied by complete excision of the cæcum and ileum.

Dr. Langford Symes said tubercular ulceration of the genital tract, even in children, was said to have occurred. There was a variety of tubercular peritonitis in children in which infection was brought about by means of the umbilical cord. The abdomen was enormously distended by gas, the child wasted considerably, but there was no ulceration of the bowel. Extensive miliary tubercles were present. A foul and fœtid discharge from the umbilicus in young children was connected with tubercular affections.

DR. WALLACE BEATTY—"Urticaria Pigmentosa."

*Photo. by Mr. R. Forbes,*
*54 Grafton Street,*
*Dublin.*

DR. WALLACE BEATTY—"Urticaria Pigmentosa."

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*54 Grafton Street,*
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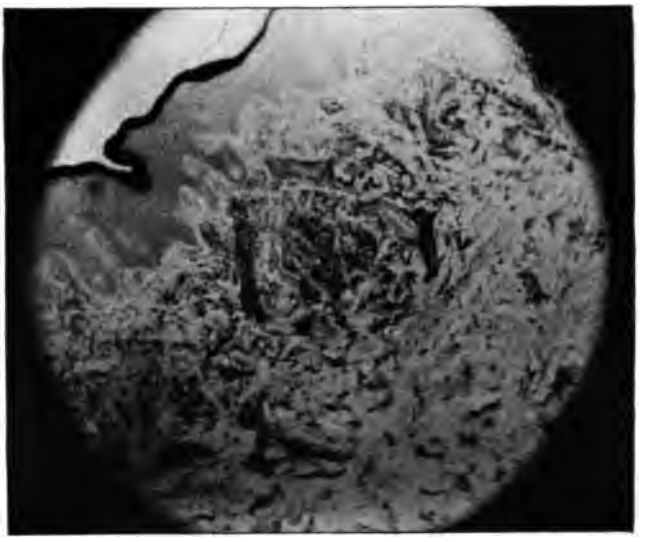
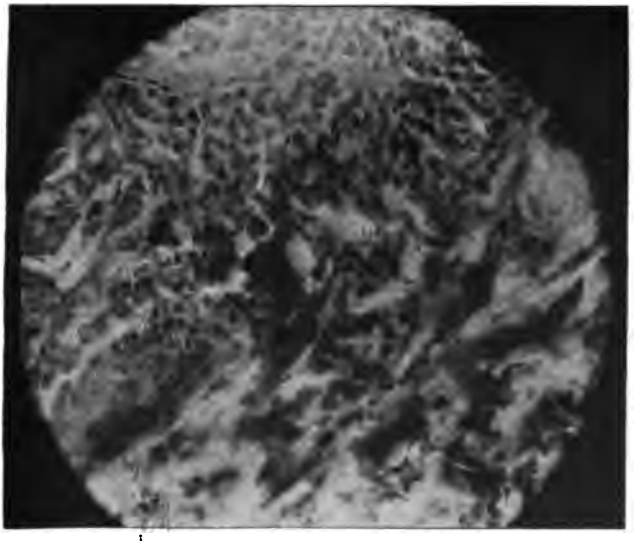


Section of Nodule of Urticaria Pigmentosa, showing masses of mast cells.
× 200.



Section of Nodule of Urticaria Pigmentosa, showing edge of a large mass of mast cells. In places their cubical outline is visible.
× 400.

*Photos. by*] [*Prof. J. Alfred Scott.*

the nodular, the macular (in which the lesions are scarcely raised)—macules may result from subsiding nodular lesions—and the mixed nodular and macular—the commonest form. Three stages occur—(1) the stage of development and increase, during which fresh nodules come—this lasts about a year; (2) the stationary stage; and (3) the stage of decline (decrease)

Itching, with typical urticaria wheals, is common, but may be absent. The patients, however, do not appear to suffer, and the general health is good. The main characters, therefore, are:—

(1) Origin in early infancy (the rule—to which there are exceptions).

(2) The occurrence of nodules—yellow, brown, or buff-coloured; these nodules persistent; pigmentation persistent.

(3) The presence of factitious urticaria (in almost all recorded cases) most easily produced at the site of the nodules.

This is a short account of the clinical appearances. The history and general condition of the child I now exhibit is as follows:—

Paul S. was brought to me by his mother for the first time in February, 1903. He was then seven months old.

*Notes of the case.*—The family history is good. Mother has had five children; four alive; one died of diphtheria after measles. Mother and father are healthy. All the children were born at full time. The mother had no miscarriages. The three children other than the patient are healthy, and have a normal skin.

*Personal history of the child.*—Born at full time. Skin appeared healthy at birth. When the child was a month old his mother noticed one big mark, raised, on one leg above the ankle; others came after this. In a short time the face and other parts became affected. The spots are irritable, make the child uneasy, but in other respects the child is in good health. He has been fed on the mother's breast. Lesions typical of urticaria pigmentosa

abundantly present on the trunk, extremities and face. The scalp free.

On May 1st, 1903, an erythematous blush appeared on forehead, extending back on scalp. The child was not ill. The next day a measly-like eruption developed over the body, but without cough. The child had no fever when I saw him on the 3rd of May, and was lively all through. I looked upon this passing eruption as a form of erythema. It disappeared in a few days.

There was very little variation in the appearance and distribution of the lesions during the year 1903, and early in 1904, when I exhibited the boy at the Dublin Biological Club, so one description will suffice.

*Scalp.*—Free. Mother had never observed any spots on the scalp; nothing, but a little scaliness of vertex.

*Face.*—Forehead free, except just above left eyebrow—here a very few small papules, 1½ m.m. in diameter. On right temple, yellowish macules. *Eyelids.*—Both upper lids free; slightly above inner canthus of the right side one small nodule 1½ m.m. in diameter. Right lower eyelid free. On left lower eyelid one small, transversely elongated, pale yellow lesion at the outer part of the eyelid near the border of the lid. *Eyebrows.*—Right eyebrow free. On the left eyebrow two or three slightly elevated, pale yellow lesions 1½ m.m. in diameter. *Cheeks and Chin.*—Nodules about ½ c.m. in diameter, buff-coloured, with some surrounding redness; a kind of semicircle of pea-sized nodules round the chin, forming a curve from angle of mouth round chin, with concavity of the curve directed upwards. Lesions on cheeks mainly distributed below the level of a line from orifice of external auditory meatus to ala of nose on each side.

*Ears.*—A few lesions, 2 m.m. in diameter on outer surface and margin of lobules, of a light fawn colour, and soft to the touch.

*Neck.*—Lesions numerous.

*Trunk.*—Yellowish and brownish nodules and macules from 2 c.m.m. diameter upwards; some considerably larger, elongated, running in the direction of the ribs. A vertical line of solid nodules above gluteal cleft. On prepuce a few small papular lesions.

*Upper extremities.*—Lesions more numerous on flexor than on

extensor surfaces. A thick, firm infiltration in right ante-cubital fossa. Palms and soles affected with plane-surfaced, raised, circular, reddish lesions of about ½ c.m. in diameter.

*Lower extremities.*—Buff-coloured nodules and transversely elongated extensive infiltrations in creases or folds of the skin. On the back of one knee a transverse linear lesion.

Enlargement of the posterior cervical glands is present—a symptom specially noted by Dr. E. Graham Little. The lesions are, therefore, copiously distributed over the body, sparing the scalp. They consist of—

(1) Small circular nodules; very small and typically buff-coloured on lobules of ears. These nodules are about 2 m.m. in diameter. On cheeks and chin are similar nodules mixed up with larger ones.

(2) Circular nodules, larger, 3 m.m. to 1 or 1½ c.m. in diameter.

(3) More extensive infiltrations running transversely on limbs.

(4) Large brownish-red macules on trunk. Factitious urticaria could be produced.

The pathological anatomy of urticaria pigmentosa was first studied by Thin,[1] who found a marked sub-epithelial cellular infiltration, which he thought was lupoid. To Unna is due the recognition of the true character of these cells—namely, a cellular infiltration in the upper part of the cutis made up of mast-cells. The infiltration is present in the middle of the cutis mainly, but the papillæ contain many mast-cells, and columns of mast-cells extend down around the vessels into the subcutaneous tissue.

*Mast-Cells.*—Mast-cells—a name given by Ehrlich—are described as cells—round, oval, or spindle-shaped, rarely branched—which contain in their protoplasm granules of a coarse kind, stainable by basic aniline dyes—that is, basophilic granules. They are brought out best by Unna's polychrome methylene blue, which stains the granules red, the nucleus blue. They are also well brought out by Pappenheim's stain, pyronin and methyl green (granules orange), or by dahlia (after Ehrlich). Mast-cells occur

in small numbers in health, being especially numerous in pigmented regions (scrotum, nipple), occur in considerable numbers in the neighbourhood of the epithelial growth in cutaneous cancers, but in urticaria pigmentosa they are found in enormous numbers, the nodules being made up entirely of these cells. Their shape, when closely packed, is cubical or polygonal. The nature and origin of mast-cells is a disputed question. Unna believes they are derived from connective tissue cells, others consider they are derived from leucocytes which have escaped from the vessels and have formed granules in their protoplasm.[2]

With the exception of some flattening of the papillæ and the presence of pigment in the basal layer (and higher layers sometimes) of the rete, and dilatation of lymph spaces and blood vessels, no other material change has been found in this disease.

Where do these cells come from that are found in so great numbers in urticaria pigmentosa?

(1) Are they leucocytes escaped from the blood vessels? Unlikely, as mast-cells have not been found in the blood in this disease. If the enormous masses of cells were escaped leucocytes they ought to be found in the blood of the patient.

(2) Are they due to proliferation of connective tissue cells, a sudden proliferation at the time of the formation of the nodule? A difficulty in accepting this view is that it is hard to conceive that proliferation could take place so quickly, and especially that no karyokinetic figures have been found in the nuclei of the cells.

A third view, and one attributed to Unna, is that while mast-cells are derived from connective tissue-cells the accumulation which occurs in urticaria pigmentosa is due to a sweeping together from neighbouring parts of mast-cells to one part.

Gilchrist's[3] experiment is interesting. He examined a piece of unaffected skin of an urticaria pigmentosa case, a 4-minute, 10-minute, and 20-minute wheal. He found a greater number of mast-cells than in the normal skin, and a progressive increase in the 4-minute, 10-minute, and 20-minute wheal, and the mast-cells were not only around the vessels, but some distance from them. The conclusion arrived at is that the skin of an urticaria pigmentosa is richer in mast-cells than an ordinary skin, and that the accumulation of cells is of connective tissue origin, and not from the blood.

As to the pathology, or true nature of urticaria pigmentosa, there is no certainty.

The two conditions present—urticarial elevations and a tumour of mast-cells—have to be accounted for. No one accepts Thin's view that the infiltration is lupoid. It must be remembered that Thin's observations were made years ago, before the special stains for mast-cells were generally known, and to him must be given the credit of having recognised that the lesions were due to a cellular infiltration beneath the epidermis.

Unna considers that a nervous irritation still unknown acts on the peripheral ganglia and determines a hyperæmia, then a deposit along the vessels of special cells—mast-cells. He believes this accumulation is rather the result of a migration than of a reproduction at the place. The pigmentation is due to the prolonged irritation, and the pigment is deposited in the cylindical cells of the rete.

Raymond considered that the disease depended upon a peculiar angioneurosis; that there is both a vasomotor hyperexcitability causing the wheals and a nutritional change in the cutis, a dystrophy of the cutis, which ends in the formation of peculiar cells, so-called mast-cells,

mast-cells being present in cases of chronic irritation of the connective tissue.

Brongersma[4] (Amsterdam) considers that there is a congenital increased tendency for the connective tissue-cells to change into mast-cells in persons who develop urticaria pigmentosa, and that the urticarial wheal is but a secondary symptom. The tendency to urticaria can be explained, he says, by the observation that in places one finds large masses of mast-cells, while in other places there exist quantities of the mast-cell granules lying free. He considers enough attention has not been directed to this point. By the peculiar reactions which the mast-cell granules give to staining re-agents, some peculiar, probably chemical, change has taken place in the protoplasm of the cells which have been transformed into mast-cells. He thinks it possible that when these granules lie free in the lymph spaces and gain access to the blood they act as a toxin which is capable of producing the change in the superficial circulation which gives rise to the urticaria. He explains the collection and arrangement of mast-cells round the vessels, hair follicles, sweat ducts, and glands by the supposition that the cells would naturally tend to accumulate in these situations where they meet resistance during their conveyance through the tissues. He thinks the toxic view would explain how the urticaria may sometimes only make its appearance on portions of skin which have been previously affected, the macules forming loci minoris resistentiæ.

Neisser believes that in urticaria pigmentosa we have to do with mast-cell tumours like nævi.

The latest contribution to the study of urticaria pigmentosa is that of Dr. E. Graham Little[5]—a most excellent, clinical and microscopic account of the disease.

I shall now briefly describe the microscopic appearances

I have found in my sections of a small nodule excised for me by Mr. Gordon—taken from the inside of one knee. I fixed and hardened one half of the nodule in absolute alcohol. The other half I fixed by placing for some hours in Zenker's[6] fluid (*i.e.*, Müller's fluid saturated with corrosive sublimate plus 5 per cent. glacial acetic acid). I then washed it in water and hardened it in alcohol.

*Mast-Cells.*—I find them, as has been described, densely packed in the middle layer of the cutis, there being a narrow strip with very few mast-cells between the dense accumulation and the epidermis. This superficial part of the cutis contains, however, a number of cell nuclei—whether they are mast-cells imperfectly stained or cells about to become mast-cells I cannot affirm. Where the mast-cells are densely packed they are cubical in shape. Rows of mast-cells are present round the blood vessels. Mast-cells are seen in masses, rows, and lines. (See photo-micrographs kindly taken for me by Professor J. Alfred Scott.)

The staining of the granules in the protoplasm of the mast-cells is interesting.

Sections of the portion of nodule fixed and hardened in absolute alcohol, when stained with Unna's polychrome methylene blue, and decolourised with glycerine ether mixture, show the granules of the mast-cells very plainly stained red. Unna's polychrome methylene blue is methylene blue which has been treated with potassium carbonate or left for a long time. By-products (oxidation products) of methylene blue—viz., methylene azure and methylene violet—develop, and possibly methylene red. The red staining of the granules has been attributed to methylene azure or to methylene red.

Sections from the portion of the nodule fixed in Zenker's fluid before final hardening in alcohol show granules

bluish with polychrome methylene blue; but when stained with eosin, followed by alkaline methylene blue, they show the granules stained red by eosin. That is to say, the mast-cell granules appear basophilic in alcohol fixed sections, acidophilic in "Zenker" fixed sections.

A similar observation I made in section of skin taken from a case of pemphigus foliaceus.

These considerations present themselves:—

(1) Has Zenker's fluid so altered the granules of the mast-cells as to render them acidophilic instead of basophilic, as they appear to be when alcohol alone is used?

(2) Are the granules of the mast-cells really basophilic? If the red colour of these granules is due to the methylene azure of polychrome methylene blue, it is to be noted that methylene azure is an oxidised methylene blue, and contains the $SO_2$ group—*i.e.*, a less basic body than the methylene blue from which it is derived.

Possibly the true explanation of the red colour of the granules of the mast-cells, when the sections are treated with eosin, followed by Löffler's methylene blue, is that these granules are really stained by methylene azure. Nocht[7] and Robin found that on bringing methylene blue and eosin together there is formed a methylene azure, along with other compounds. If so, the stain is practically the same as if polychrome methylene blue were used. However, the fixing agent is not without some influence, as the mast-cell granules in sections made from the portion of the skin which was fixed in Zenker's fluid do not take the characteristic red colour, but a bluish colour, with polychrome methylene blue.

These, however, are chemical and histological questions which are beyond my knowledge. I simply throw them out as suggestions.

*Pigment.*—I did not find pigment granules, but the

nodule from which the sections were taken was not apparently pigmented.

*The connective tissue and elastic tissue.*—Except that the fibres are displaced where the mast-cell accumulations are these tissues appear well preserved. I prepared sections by both Weigert's and Unna's methods.

*The blood.*—The only observations I have made are:—(1) I could find no mast-cells in the blood. (2) The lymphocytes were increased in number. Professor J. Alfred Scott confirmed this observation. He found an equal number of lymphocytes and polynuclear leucocytes.

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[1] La Pratique Dermatologique.
[2] Macleod. Handbook of the Pathology of the Skin.
[3] E. Graham Little's Experiments. British Journal of Dermatol. January, 1906.
[4] Brit. Jour. Dermat. Vol. XI. 1899.
[5] Brit. Jour. Dermat. Oct., Nov., Dec., 1905; Jan., 1906.
[6] Mallory and Wright. Pathol. Technique.
[7] Physiological Histology. Mann.

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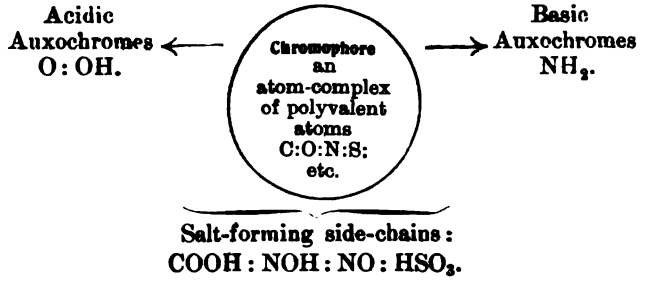
DR. O'CARROLL said there were two fundamental theories regarding the origin of this disease—viz., that it is either (1) a structural or anatomical lesion or (2) a chemical one.

PROFESSOR SCOTT said on examining the blood he found the lymphocytes existed in almost equal amount with the polynuclear leucocytes. The granules were of a proteid nature, and would be acted upon by re-agents. They would be altered by such chemicals as corrosive sublimate.

DR. WALTER SMITH thought it not improbable that, in the near future, the closer study of stains and dyes might throw some light upon the important problem of the nature of proteid substances. He pointed out that an efficient stain usually included or was made up of three constituents:—(1) A nucleus, or chromophore, with a feeble acid or basic tendency. The chromophore usually belongs to the aromatic series, and includes polyvalent atoms—*e.g.*, C: O: S: N. (2) Auxochromes, re-

presented by $NH_2$ (basic group), or (OH), and oxygen (acidic radicals), tacked on the chromophore, and, correspondingly, modifying its properties. (3) Salt-forming groups—*e.g.*, carboxyl, COOH : sulphonic group, $HSO_3$, NOH : $NO_2$.

This may be represented diagrammatically :—




The general theory of staining depends upon physico-chemical interactions between the stain and the tissue.

Dr. O'Brien said that any side-light that could be thrown on the pathology and ætiology of the disease would be productive of good results as regarded the treatment and diagnosis.

Dr. Wallace Beatty briefly replied. He said—Some thought urticaria pigmentosa might possibly be of congenital origin, like nævi. The child he exhibited was in the stationary phase of the disease ; and he had never seen a further advanced case. In his experience he had only met with two cases in the early stage.

# A CASE OF ANGIO-SARCOMA (CYLINDROMA) OF THE BRAIN.

By E. J. McWEENEY, M.A., M.D., F.R.C.P.I.;
Professor of Pathology, Catholic University Medical School.

[Read in the Section of Pathology, May 4, 1906.]

The patient, Henry H., aged thirty-nine years, labourer, was admitted to the Mater Misericordiæ Hospital, September 15, 1905, under the care of Dr. Joseph Redmond, whose kindness in permitting me to publish the case I have much pleasure in acknowledging. Patient's previous history was unimportant, save for a suspicion of syphilis, of which there was, however, no objective sign. About four months ago he was engaged packing goods on top of a cart and had to jump suddenly to the ground in order to avoid being struck with a chain. The shock dazed him for a time, but he soon felt all right. Three weeks later he began to suffer from pains and numbness in his feet and legs. These got worse, but there was no loss of power at that time. One evening a week later whilst at tea he overturned a jug of milk in the attempt to take it up in his left hand. Later still he noticed that he had not perfect control over the left arm. His left leg also became weak and seemed to drag. Shortly before admission he began to suffer from headache, which has lasted till the present time. He suffered from diplopia and "weak sight" in the left eye.

*On admission* he was found to have well-marked left hemiplegia and hemianæsthesia. Knee-jerk lost on both sides; plantar reflex lost on the left, present on the right side. The tongue on protrusion deviated slightly towards the left. There was slight optic neuritis on both sides. The left great toe was hyper-extended. Babinski's sign present. When in hospital he lost control over the bladder, which became distended and had to be emptied with the catheter. He grew gradually weaker, and the sensorium duller, until death supervened on the 18th of

October without indication of any local disease excepting that of the central nervous system.

At the autopsy the central nervous system was removed entire and hardened in formalin, after which it was examined by the method of sections. The *tumour* was found to occupy the centre of the right hemisphere, projecting into the lateral ventricle, the body of which it partially filled, completely obliterating the descending cornu. Its size and shape were, roughly, those of a Tangerine orange. Its nearest approach to the surface was at the base of the temporo-sphenoidal lobe, where it came within 5 mm. of the surface, and only just escaped infiltrating the cortex. At the bottom of the Sylvian fissure it was also very near the surface. It extended into the basal ganglia, infiltrating caudate nucleus and optic thalamus, but sparing the lenticular nucleus. The internal capsule was quite distinctly seen, even its posterior part, and did not seem to be infiltrated, though it must have been pressed upon. The crus was, however, greatly infiltrated, and so were the superior peduncles of the cerebellum. The aspect of the tumour was threefold—viz., the central portions were either yellowish and spongy or hæmorrhagic and broken down, or else greyish-white and hard, whilst the peripheral zone was mostly of the last-named character.

*Minute Anatomy.*—Several blocks representing every part of the tumour were embedded in celloidin and cut into sections averaging 10$\mu$ thick with a Thoma-Jung microtome. The most satisfactory stained preparations were obtained with Weigert's new hæmatoxylin,[a] which allows of a much more perfect Van Gieson counterstain than any hæmatoxylin preparation I have ever came across. The stain is perfectly differential, and, withal, so deep as to be unaffected by the picric element of the Van Gieson, which turns other hæmatoxylin stains brown or bleaches them altogether. The most ideal triple staining is obtained when, in order to avoid losing the yellow component, the preparations are cleared with anilin-xylol, saturated with picric acid, and then passed through pure xylol. Thus stained, the tumour was seen to be made up of medium-sized oval cells, or rather

[a] For this, two solutions are used, viz., (*a*) Hæmatox-cryst, 1; 96% alcohol, 100; and (*b*) Liq Ferri Sesquichlorat (Ph. Germ), 4 c.c.; Hydrochloric Acid, 1 c.c.; Water, 100 c.c. Mix equal parts of *a* and *b* when required for use.

nuclei, for the cell boundaries were seldom distinctly seen. Their character was, so to speak, "indifferent," with a leaning towards connective tissue rather than epithelial "complexion." Intracellular fibrils were occasionally demonstrable, for the most part indistinct or absent. The growth obtained its distinctive character from the grouping of these cells, which was essentially perivascular. Blood vessels were seen cut at various angles, and each surrounded by an ensheathing cylinder of tumour cells which were not close packed immediately round the outside of the vessel, but were loosely arranged in a spongy manner, having a zone immediately external to the outer coat, nearly free, and becoming more compact as one proceeded outwards. Moreover, their long axis was perpendicular to the wall of the blood vessel, so that they seemed literally to radiate from it. Several small blood vessels were often seen to be surrounded by a common growth of tumour cells.

Starting from the centre, the succession of parts in a tumour cylinder was as follows:—First came the vessel, which was usually thin-walled like a small vein, the wall being composed of some hyaline substances which stained a brilliant red with Van Gieson. Then came an almost empty zone containing a few tumour cells which seemed to give out delicate inter-communicating processes. Outside this again the cells were more condensed, and then gradually ceased, giving place to a structureless material, faintly granular in texture, staining diffusely, and probably necrotic. It took a dull red with Van Gieson. These necrotic portions had themselves in places the aspect of cylinders, and were surrounded by tumour cells in such a way as to suggest that they (the cylinders) were composed of vessels that had undergone obliteration and necrosis. Every stage of hyaline thickening of the vascular walls, with subsequent obliteration of the lumen, could be traced. The obliteration was partly due to hyaline thrombi, partly to altered blood corpuscles undergoing hyaline change, and partly to genuine thickening of the walls through deposit and formation of hyaline matter which behaved like amyloid (but not to iodine). When the perivascular arrangement of the tumour cells prevailed the blood vessels were numerous, large, and seemed to be newly formed. Elsewhere the perivascular arrangement was absent, the vessels were much

less conspicuous, and the aspect of the growth was more uniform and suggested spindle-cell sarcoma. Such was the character of the portion of growth that invaded the choroid plexus. The vessel walls were here much thickened and hyaline, but their epithelial coating was unbroken, and the tumour cells pushed the plexus to one side without infiltrating or destroying it. No distinct capsule could be made out, but as the margin was reached the neuroglia and nerve-cells and fibres gradually made their appearance. A very remarkable point which deserves special attention as throwing light on the histogenesis of this tumour is that some of the small blood vessels of the brain substance near the edge of the tumour showed mitotic figures in their perithelium, and also in their endothelial lining. This would seem to prove what may be suspected from the figure that there was a genuine new formation of blood vessels with tumour growth in their perithelium and sprouting of their endothelium, the latter process being speedily checked by hyaline degeneration of the products. It would further go to show that the neoplastic stimulus was diffused over a wide area of brain tissue and not confined to one spot, as Ribbert maintains is the case in cancer.

I purposely refrain from references to the literature which I have not had time to fully consult, and will merely add that although a full and careful *post-mortem* examination was made, no secondary deposits were found. Nor did a careful series of sections stained by the Weigert and Pal methods reveal the smallest trace of degenerative processes in the spinal cord.

# ABSTRACTS.

## SECTION OF PATHOLOGY.

*Friday, October* 27, 1905.

The PRESIDENT in the Chair.

THE PRESIDENT delivered the opening Address on "The Relation between Clinical Medicine and Pathology."

### *Spirochæte in Syphilis.*

PROF. MCWEENEY said since the discovery by Schaudinn last spring that a particular variety of spirochæte—the *Sp. pallida*—is of regular occurrence in syphilitic chancres, the observation has been confirmed by at least one hundred independent investigators working in all parts of the world; and the organism has now been found not merely in primary lesions but in the associated indolent buboes, mucous tubercles, unbroken cutaneous roseolæ, papules, and other forms of eruption, and also in the blood of cases in the secondary stage. Moreover, it has been found in the spleen, liver, and other internal organs of syphilitic fœtuses. In view of the probability, that the organism may turn out to be the cause of syphilis, he thought it of interest to show some specimens which he had taken from chancres and condylomata at the Lock Hospital, from cases under the care of Drs. H. FitzGibbon and Pugin Meldon, to whom, as well as to Col. Baker, Major M'Leod, and Capt. Falkiner, R.A.M.C., the officers in charge of the Arbour Hill Military Hospital, he expressed his thanks for permission to use the material under their control. By way of contrast he showed *Spirochæte refringens*, a somewhat thicker and less closely coiled form from non-specific condylomata. Schaudinn has quite recently described locomotive organs in these parasites—terminal cilia in the case of *Sp. pallida*, and an undulating membrane in the case of *Sp. refringens*. The exhibitor showed, by way of illustration, a specimen of a huge spirillum, 45 $\mu$. long, with cilia on each end, which he had cultivated from sewage.

*Blood containing Mast-Cells.*

PROF. MCWEENEY showed specimens made from the blood of a man aged thirty-four (O'B.), a patient of Dr. Martin Dempsey, in the Mater Hospital, suffering from anæmia of obscure nature, attended with attacks of bleeding from the lower bowel, and slight albuminuria. The blood-count was very remarkable :—Reds, 2,856,000 ; whites, 11,300 ; polynuclears, 46.5 per cent. ; small lymphocytes, 15.3 ; large mononuclears, 27 ; eosinophils, 7.2 ; mast-cells, 2.6.—the coarsely granular cells being thus 9.8 per cent. of all leucocytes. There was marked mononucleosis, especially prominent being the large hyaline mononuclears. There was marked granular degeneration of the reds in many cases (punctate basophilia), but normoblasts were very scarce and megaloblasts were absent. Hb. 45 per cent. After a week under treatment with iron and arsenic the mast-cells had undergone marked diminution, specimens being hard to find, but the eosinophils were as numerous as before.

*Unusual Form of Senile Tuberculosis.*

PROF. MCWEENEY also showed this specimen, which consisted of the lung of a woman, aged seventy-five, who in the street was suddenly seized with profuse hæmorrhage from the mouth and nose, and died immediately after admission to hospital. At the autopsy a tubercular condition of the lower part of the right lung was found, which had converted most of the middle lobe into a dense cicatricial tissue of greyish hue. The lower lobe was studded with very large slate-grey tubercles, and there was a single small cavity as big as a hazel nut which had ulcerated into a branch of the pulmonary artery and given rise to the fatal hæmorrhage. The cavity was lined with caseous matter, swarming with tubercle bacilli, many of which were peculiarly branched. The occurrence of fatal pulmonary hæmorrhage from tuberculosis in a patient aged seventy-five seemed sufficiently unusual to justify its being brought forward.

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*Friday, November* 24, 1905.

The PRESIDENT in the Chair.

*Aneurysm of Aorta.*

THE PRESIDENT and DR. EARL showed an aneurysm which came

off the aorta a little above the aortic valve. It lay between the aortic arch and the base of the heart, and pressed on and flattened the pulmonary artery. Hypertrophy and dilatation of both chambers of the right side of the heart.

PROFESSOR MCWEENEY described a case in which there was an aneurysm in the thickness of the wall of the heart, having started near the sinus of Valsalva, corresponding to the left posterior cusp of the aortic valve, and penetrating for a distance of three inches the septum and adjoining part of the wall of the ventricle. It had produced great necrosis of the heart muscle. The heart was enormously hypertrophied, weighing thirty-one ounces. The clinical diagnosis of incompetence, and perhaps stenosis of the aortic orifice, was perhaps correct. He called attention to the fact that it had recently been found possible to produce aneurysms in animals experimentally by the continual injection of extract of supra-renal capsule; therefore, it would appear that one of the pathological factors in the production of aneurysm would be some toxin, with a capacity for raising the arterial pressure.

*Lymphosarcoma of the Mediastinum.*

MR. SETON PRINGLE showed a specimen of lymphosarcoma of the mediastinum. The patient, a man of thirty years of age, had for eight weeks before death presented the following signs and symptoms:—A firm œdematous swelling of the upper thorax, head and neck more marked on the right side, greatly distended veins on the arms, dyspnœa, dysphagia, cyanosis, and an area of dulness behind the manubrium and upper part of the gladiolus sterni, and extending two inches beyond the right sternal margin. All these signs gradually increased in severity, and a left pleural effusion developed some days before death. At the *post-mortem* the growth was found extending from the arch of the aorta to the upper border of the sternum; it also extended back on either side of the trachea, and on the left side pressed on the œsophagus, while the right lung was extensively infiltrated, and adherent to the growth above the root. The innominate and left common carotid were embedded in the tumour, the two innominate veins were stretched over it, the right in one place being almost encircled by the growth, the superior vena cava

was practically surrounded, and the vena azygos major could not be separated from the tumour mass. The pericardium and left pleura were distended with fluid; there was no ascites or œdema of the legs, no enlarged glands could be found, the spleen and liver were normal. Mr. Pringle called attention to (1) the very rapid growth; (2) the fact that the pulse was equal and synchronous in both radials although the innominate artery was embedded in the growth, and the left subclavian free; and (3) the presence of recent pleuritic adhesions on the right side, that is—the side on which the lung was involved.

### *Lymphosarcoma.*

Dr. T. G. Moorhead exhibited a lymphosarcoma of the anterior mediastinum. The patient from whom the specimen was obtained had first noticed an enlargement of the glands in her groin, neck, and axillæ two years previously. When first seen in May, 1905, she presented the typical appearance of Hodgkin's disease, except that there was no splenic tumour. The leucocytes were reduced to 3,000 per c.m., and showed a relative excess of eosinophiles and hyaline cells. When seen again in August, 1905, her condition was unchanged, but twenty days later she returned with the glands swollen to five or six times their former size, and with distinct evidence of thoracic involvement. At the *post-mortem* a typical lymphosarcoma was found in the thymic region, and most of the cervical and axillary glands had extended beyond their capsule. The aortic glands were also enlarged, as were the Peyer's patches, and there were slight nodules in the spleen, which organ was, however, unusually small. Microscopically there was considerable necrosis of the lymphosarcomatous masses, and the blood vessels and connective tissue all exhibited a hyaline change. Dr. Moorhead expressed the opinion that the case was what is generally regarded as acute Hodgkins' disease, and stated his belief that that process was identical with lymphosarcoma.

Mr. Pringle referred to a note in the *Lancet* in which an observer in Switzerland described the finding of an abnormally large leucocyte in the blood in lymphosarcoma, which he considered of use in the diagnosis.

Dr. Travers Smith asked was there any relative lympho-

cytosis, and was the spleen palpably enlarged when the patient first came under Dr. Moorhead's notice ?

DR. MOORHEAD said he had only noticed very big hyaline cells, especially towards the end of the case. He thought these were common in the condition.

The spleen was at no time enlarged to palpation. An early blood-count showed—neutrophiles, 68 per cent.; eosinophiles, 6 per cent.; lymphocytes, 17 per cent.; hyaline, 9 per cent. In August the eosinophiles were 5 per cent., and hyaline 9.5 per cent. The total number of leucocytes was from three to four thousand throughout.

MR. C. ARTHUR BALL read a paper on an "Unusual Tumour of Kidney" (see page 366, *ante*).

DR. T. G. MOORHEAD read a paper on "Melanuria" (see page 372, *ante*).

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*Friday, January* 5, 1905.

THE PRESIDENT in the Chair.

*Fractures of Os Calcis and Astragalus.*

PROFESSOR BENNETT said—One reads in the present day the old assertions about fractures repeated as if they had not been put aside by the accumulated knowledge of the last century. I take this example from a book bearing the date 1900:—"Fractures of the tarsal bones are always caused by direct violence (passing of a carriage wheel), falling of a heavy weight upon the tarsus." To put any addition to our knowledge of the fractures of the tarsus is a matter of interest in helping to wipe out the "always" from the passage I have quoted. Bad anatomy does not help us in this difficulty. "The astragalus is a peculiar bone, inasmuch as it articulates with four different bones and shows no point of insertion of any tendon." May not the horizontal division of the external lateral ligament be regarded as tendon ? I regret that I am not able to state anything of the life history of the examples I now record, but I present them as I have them. The first of these is a left os calcis which Professor Dixon kindly gave to me this session, because the portion of bone forming the articular surface in front of the sustentaculum tali is wanting. The specimen agrees in many particulars with the case of Legouest,

figured in the Thesis of A. Ballenghien,[a] and is wanting in the fact that the little piece of bone has not been preserved. My next two specimens concern the astragalus. Some five and twenty years ago I published a discussion on the supposed fracture of the tubercle of the astragalus, whether it be a fracture or not or a vestige of the ostrigonum tarsi.[b] I have multiplied specimens of this kind, until now my series number eleven. Here I show a united fracture of the same region of the bone, without doubt a fracture well and truly knit, but how caused I cannot say. The anterior part of the tubercle with the groove for the tendon of the long flexor of the great toe has been broken and united with the minimum degree of deformity. The question which is most difficult of solution is—How did it get broken? By what force, direct or indirect? Lastly, I show a specimen which I am again very hard set to read. I put this by in spirit last summer, puzzling over it to find some solution of its mysteries. While the summer passed the spirit sped away, and when I came back to my work almost all my mysterious signs of fracture had gone. See how I got the specimen! A student in his first year had dissected the lower extremity to the last shred, and he had got the astragalus isolated neatly from the bones of the leg and from the tarsus, and, seeing me pass, asked me to look at "the fracture." I agreed in his diagnosis. I said I could see no damage or trace of it in the bones of the leg or of the tarsus, and for some reason, being pressed for time, I was content to walk off with the bone. No one here would give me credence for my diagnosis of fracture had I not put the specimen in water a few days ago, and so repaired the damage of the evaporated spirit. Read the lesion as you like. A fracture it was, taking effect on that part of the head of the bone that rests on the calcaneo-scaphoid ligament, and it has not passed to any deeper extent than the cartilage.

*Cancer of the Œsophagus with Secondary Growth in the Heart.*

Dr. Travers Smith exhibited some of the thoracic viscera of a man, aged seventy, who had died under his care in the Whitworth Hospital of flat-celled cancer of the œsophagus. The growth had caused a very narrow stricture, and had grown by

[a] Thèse par A. Ballenghien. July 20, 1890. Page 126.
[b] Journal of Anatomy. Vol. XXI.

direct extension into the outer coat of the descending aorta. Numerous small secondary deposits were also found in the outer coat of the aorta, and the bronchial lymph glands were cancerous. Embedded in the wall of the left ventricle near the auriculo-ventricular groove was a secondary deposit the size of a large hazel-nut, which on microscopical examination, made by Dr. Earl, showed typical flat-celled arrangement. There were no metastases of the disease below the diaphragm with the exception of a cancerous deposition in a single lymph gland situated under the peritoneum on the anterior aspect of the stomach near the œsophagus, and nearer the lesser curvature than the greater. Dr. Travers Smith laid stress upon the frequency with which this gland was affected in internal, especially abdominal, cancer. He also spoke of the difficulty in fully explaining how the secondary deposit in this case had reached the heart.

THE PRESIDENT said that an interesting point had been raised—namely, the dissemination backwards against the lymph stream. This must often happen also in various forms of tubercle. The particle must be supposed either to have gone against the stream or else it had been carried by the subclavian, returned by the vena cava, and going through the pulmonary system was deposited by the coronary artery in the heart.

PROFESSOR BENNETT said the same thing must occur in cancer *en cuirasse*, as the cancer certainly did not follow the lymphatic stream.

DR. LITTLE said that in cases of tubercular meningitis the original lesion was often found in the bronchial glands, so that in such cases the infection must also travel against the stream.

THE PRESIDENT read a paper on "Hydrocephalus" (see page 379, *ante*).

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*Friday, February* 16, 1906.

SIR THORNLEY STOKER, President of the Academy, in the Chair.

THERE was a general discussion on the Diagnosis, Pathology, and Treatment of Abdominal and Pelvic Tuberculosis. See pages 385 to 416, *ante*.

*Friday, March* 16, 1906.

THE PRESIDENT in the Chair.

### *An Uncommon Form of Renal Disease.*

DR. PARSONS exhibited kidneys which had all the appearances of the congenital-cystic form, only a small portion of the kidney substance being left intact. The patient, a labourer, aged forty, was in his usual good health until the day before his death. Suddenly becoming ill he was admitted to hospital, where he died in twelve hours. Clinically he exhibited symptoms of gastro-intestinal irritation, with suppression of urine. The autopsy revealed nothing amiss except the kidneys shown.

DR. O'CARROLL said it would be interesting to know whether the condition was congenital or not.

PROFESSOR SCOTT considered the condition as being of the nature of hypertrophic cirrhosis, due to a pathological change, that must have begun within the last ten years at least.

DR. TRAVERS SMITH said that some brain trouble might possibly account for the sudden death of the patient.

DR. PARSONS said the brain was examined, and was found normal. He considered it to be more a case of congenital cystic kidneys than of chronic interstitial nephritis.

### *Aortic Aneurysm perforating Pulmonary Artery and causing Perforation of Pulmonary Valves.*

PROFESSOR O'SULLIVAN said the patient from whom the specimen was taken was brought in a dying state to hospital. The *post-mortem* showed an aneurysm of the aorta on the right side, half an inch above the attachments of the valves, and perforating the pericardium. It had also perforated the pulmonary artery above the valves, and the valves themselves showed evidence of perforation. This latter condition, he said, was caused by the blood-stream that had passed from the aorta into the pulmonary artery.

DR O'CARROLL mentioned a case, almost identical, that had been shown him by Dr Earl, but he was not certain as to the involvement of the valves.

### *Epitheliomatous Penis.*

MR. E. H. TAYLOR exhibited a penis removed for epithelioma.

*Epithelioma involving part of the Duodenum where the Bile-duct opens into the Intestine.*

MR. E. H. TAYLOR said—The man, aged forty, had several attacks of jaundice, which gradually disappeared after each attack. When he came to hospital his liver was somewhat enlarged, and his skin slightly jaundiced. On opening the abdomen the gall-bladder was distended, and a great number of gall-stones were found in the common bile duct. Found a hard mass in the duct where it opens into the duodenum, which he removed. On the 9th day the patient's temperature rose, and he developed pneumonia, from which he died. Dr. O'Sullivan made the *post mortem*, and found a cancerous mass at the mouth of the duct. There was no obstruction to the flow of bile, and the liver was enlarged and cirrhotic.

*Cancer of the Ovary.*

MR. E. H. TAYLOR said—This tumour was removed from a woman, aged fifty-five. On examination it seemed like circumscribed peritonitis, and could be felt just above the pelvis. The tumour was more easily palpated when the patient was under the anæsthetic. On opening the abdomen a quantity of bloody fluid poured out. The patient will be able to leave hospital next week.

DR. O'CARROLL said the jaundice in the case of the epithelioma of the duodenum was due to the gall-stones, and not to the cancer.

PROFESSOR O'SULLIVAN said the duodenal epithelioma resembled a papilloma in many respects. As to the development of pneumonia it was interesting to note that the diplococcus of pneumonia was found in the bile duct before any trouble appeared in the lung. It was held that croupous pneumonia did not originate from the blood, but through the air passages. It was probable in this case, however, that the diplococci might have reached the lung by extension from the under surface of the liver through the diaphragm.

DR. WALLACE BEATTY read a communication on "Urticaria Pigmentosa" (see page 417, *ante*).

*Friday, May 4*, 1906.

The PRESIDENT in the Chair.

*Exhibits.*

DR. F. C. PURSER exhibited organs from a case of cancer of head of pancreas. He said the patient, a man, aged fifty-seven, complained of pain in the abdomen, especially in the region of the umbilicus. He gave a history of syphilis, jaundice, and great emaciation. The clinical notes revealed that the heart was normal as regarded the position of the apex beat. No murmur was heard. Patient developed sensory aphasia and hemiplegia of the right side, due to an embolus lodged in the cortical branches of the middle cerebral artery, and died on the 2nd of April. A large thrombus was found in the left ventricle, and well-marked vegetations on the aortic valves. Cocci were discernible in sections of the thrombi under the microscope. Thrombi formation in the heart was well known in cases of cancer, and it was not yet settled whether such a condition was due to organisms or to slow circulation. A hæmorrhagic infarct was found in the spleen, and secondary growths in the liver.

DR. O'CARROLL said fat necrosis was a common occurrence in pancreatic disease.

PROF. MCWEENEY inquired whether were there any thrombi on the right side of the heart.

DR. PURSER, in reply, said that no thrombi were found on the right side of the heart. In preparations of the thrombi from the left ventricle he saw what looked like staphylococci.

*Unusual Degeneration of the Liver.*

PROF. O'SULLIVAN said the patient from whom the liver was taken was a middle-aged man who had had two attacks of jaundice. He was under the care of Dr. Walter Smith and Sir Charles Ball. The latter operated, and found the common bile duct and gall bladder perfectly empty. There was no evidence of obstruction or of bile to be seen anywhere. The liver weighed 4 lbs. 5 ozs., was larger than normal, of a greenish-yellow colour, and the capsule was smooth. On section it showed greenish-yellow areas, separated by lines of red material. Microscopic examination showed that the centre of the lobule was degenerated, and

a zone of comparatively healthy liver cells was to be seen towards the periphery. The degenerated cells in the centre showed an almost entire absence of protoplasm, and their nuclei were shrunken and deformed. A great many cells were filled with granules of bile pigment, and the bile capillaries were filled with plugs of inspissated bile. There was no inflammation of the smaller bile ducts, and no sign of increased connective tissue formation. The cells were separated from each other, and had lost their columnar arrangement. No bacteria were found. In ordinary fatty liver the fatty change was at the periphery of the lobules. It seemed possible, in cases where the bile capillaries were plugged, that the degeneration of the liver cells might be due to poisoning by the bile acids produced by the cells themselves.

PROF. MCWEENEY said the outer cells of the lobules also looked degenerate. They did not give a very good nuclear stain. He would like to have seen the appearance of the lobules in preparations stained for fibrin and fat.

DR. FINNY said he saw this man in consultation the day before he died. There was no evidence of phosphorus poisoning.

PROF. WHITE said he saw a case three or four years ago which, in a certain manner, resembled the one under discussion. The patient died of sub-acute yellow atrophy. The liver showed red and yellow patches. In the red patches there was no formed connective tissue, but a small amount of granulation tissue. He did not see why this liver should not be classed with "yellow atrophy"—a condition which, in less severe forms, he thought was more common than was generally supposed. The absence of a large amount of fat in sections stained with osmic acid or Soudan III. would not prove that the liver cells had not undergone complete fatty degeneration, as the fatty products are quickly enough removed.

DR. O'CARROLL spoke of the tendency to consider the liver at fault when anything went wrong, and no other organ could be made out to be affected.

PROF. O'SULLIVAN, in reply, said the osmic acid sections which he had made had partly failed owing to imperfect penetration of the osmic acid; but even in the imperfect sections obtained the presence of fat was quite discernible. The experiments of

Rosenfeld seemed to show that even in toxic degenerations the fat found in the liver cells was mainly deposited from the blood.

*Aspergillus fumigatus in Eye.*

DR. H. C. MOONEY exhibited specimen with culture of Aspergillus fumigatus in the eye, caused by an oat husk sticking on the cornea of an agricultural labourer. After cautery was applied, the patient got well. Only sixteen or seventeen cases of the kind have been recorded, two of which occurred in the United Kingdom.

PROF. MCWEENEY said he had seen Aspergillus fumigatus occurring in the auditory meatus.

*Non-pigmented Flat Sarcoma of the Chorioid.*

DR. H. C. MOONEY exhibited and showed sections of this rare condition.

*Priestley Smith's New Method of Preserving Eyes for Museum purposes.*

DR. H. C. MOONEY described the method and demonstrated its advantage over the older gelatine, and gelatine and formalin, methods.

*Bacterial Association in a Case of Spreading Emphysematous Gangrene.*

PROF. MCWEENEY stated that the patient was a youth, aged eighteen years, admitted under the care of Mr. McArdle to St. Vincent's Hospital, suffering from compound fracture of the right humerus, the result of a hunting accident. He was unconscious, and within four hours of the accident the temperature rose to 108°, evidently from shock to the medulla. Despite careful cleansing and replacement of the bones the arm became swollen and glazed after twenty-four hours, sero-sanguineous discharge came on, which became fœtid, the limb became dark and brawny, and emphysema occurred round the shoulder joint. Owing to the brain condition, amputation was out of the question. Free opening of the cellular spaces of the arm gave issue to the fluid, which was examined. The side of the chest and neck became emphysematous, and death occurred in four days after receipt of the injury. Bacteriological examination by anaerobic

agra-plates in a Bulloch's apparatus yielded three organisms. One was a streptococcus, one a bacillus resembling *B. coli*, and the third was *Bacillus aerogenes capsulatus* of Welch and Nuttall. This proved to be a large, anthrax-like, motionless rod with rounded ends, staining well with Gram; spore-formation not observed, though it must have been present on the bacilli grown from portion of exudate that had been heated to 80° C. for ten minutes. They formed flocculent whitish colonies in gelatine and agar. The former crustations was not liquefied but only softened. Much gas formation. A rabbit injected intravenously with 1 cc. of the broth culture and then killed, and the body kept warm overnight, showed enormous distension of the solid viscera with gas bubbles ("foaming" organs). He now showed some of these organs [demonstration]. Curiously, he had failed to induce the bacillus to grow on Löffler's serum or in blood outside the body. The gas had a slight odour of rancid butter. The B.-coli-like bacillus could not ferment any sugar, and was an alkali-former—in fact the only feature in which it resembled *B. coli* was its colonies on gelatine. It was a very short non-motile rod, often resembling an oval diplococcus. If intra-peritoneally inoculated it produced purulent peritonitis in a rabbit, which however, recovered. The streptococcus grew abundantly on gelatine, made broth diffusely turbid, and was non-pathogenic for rabbits by itself, but injected along with the B.-coli-like bacillus it killed them. Cultures and microscopic preparations of all three organisms were demonstrated.

PROF. MCWEENEY read a paper on a case of "Angio-sarcoma (cylindroma) of the Brain" (see page 428, *ante*), and exhibited the specimen. He also exhibited an encapsuled sarcoma of the pons.

*Leukæmia due to Large Mononuclear Leucocytes.*

PROF. MCWEENEY showed blood films of this rare condition.

# SECTION OF STATE MEDICINE.

## COMPULSORY RE-VACCINATION: A SOLUTION OF VEXED QUESTIONS RELATING TO SMALL-POX.

By SIR JOHN MOORE M.D., D.P.H., B.A. Dubl.;
D.Sc. Oxon. (*Honoris Causâ*);
Physician to the Meath Hospital and County Dublin Infirmary.

[Read in the Section of State Medicine, February 9, 1906.]

So long as a community remains susceptible to small-pox the supposed aërial convection of the virus or poison of that dread disease and the isolation of small-pox patients are questions which must have a very lively interest for the public as well as for the medical profession.

The conflicting evidence given by medical experts on the question of the aërial convection of the *materies morbi* of small-pox has seriously influenced important legal decisions within the past few years.

In February, 1904, a case bearing on the subject of the danger of a small-pox hospital to the surrounding community came before the Chancery Division of the High Court of Justice in England, Mr. Justice Farwell presiding (The Attorney-General *v.* The Mayor and Corporation of Nottingham).[a] This was a "Quia timet" action to prevent the defendant Corporation from using as a small-pox hospital a building which they had recently erected in the parish of Bulwell, within the borough of Nottingham, on

[a] The Law Reports of the Incorporated Council of Law Reporting 1904. Vol. I. Page 673, *et seq.*

the ground that the hospital was both a public and a private nuisance. The hospital premises were within half a mile of Bestwood collieries and within a quarter of a mile of certain iron-works. The hospital itself was within seventeen yards of a public road. In addition, a considerable number of people either lived or worked within a short distance of the hospital premises. The plaintiffs were the Attorney General at the relation of several owners and occupiers of land and collieries in the parish of Bestwood. They alleged that the maintenance and use of the hospital caused grave danger of the spread of infection, and they claimed an injunction accordingly. The hospital accommodated from 30 to 40 patients. Expert evidence was given on both sides. The principal witnesses for the plaintiffs were Dr. Thresh, Medical Officer of Health to the Essex County Council; Dr. Chalmers, Medical Officer of Health for Glasgow; and Dr. M'Vail. For the defendants were Dr. Boobbyer, Medical Officer of Health for Nottingham; Dr. Hope, Medical Officer of Health for Liverpool; and Dr. Reid, Medical Officer of Health to the Staffordshire County Council.

The judge found, as the result of the evidence, that the site of the defendants' hospital was carefully chosen, was in a proper situation, and constituted no appreciable danger to the public health and no nuisance to the relator plaintiffs' property. On the question of the aërial dissemination of small-pox, the expert evidence was equally balanced for and against, and Judge Farwell agreed with Lord Justice Bowen's opinion in another small-pox hospital case that it is no part of the functions of the Court to qualify itself as an expert in science. The Court acts on the opinion of experts whose qualifications can be tested by cross-examination, and weighs the evidence so given and tested. The result was that the action failed and was

dismissed with costs, the question of the actual danger of a small-pox hospital remaining legally undecided.

To quote one other case nearer home, the action of the Attorney-General for Ireland *v.* The Urban District Councils of Rathmines and Pembroke was tried in the Dublin High Court in 1904 before the Right Hon. Hedges Eyre Chatterton, the then Vice-Chancellor.[a] The Urban District Councils in question had established in February, 1902, a Joint Isolation Hospital for small-pox and other infectious fevers at Vergemount, Clonskeagh, Co. Dublin. The site selected was in a populous neighbourhood, and abutted on public and private roads and on an electric tramway. There was a population of 750 persons within a quarter of a mile, and a population of 2,682 within half a mile, of the proposed site. An injunction was granted.

Against this decision the District Councils appealed, and, on hearing the case, the Court of Appeal reversed the Vice-Chancellor's judgment, and quashed the injunction. This was largely due to the conflicting medical evidence which was given. Dr. E. W. Hope, Medical Officer of Health for Liverpool, in particular testified that there was no evidence to show that the isolation small-pox hospitals in that city had in any way disseminated the disease.

In giving judgment in the appeal case, Lord Justice FitzGibbon said that "to sustain the injunction, the law requires proof by the plaintiff of a well-founded apprehension of injury—proof of actual and real danger- a strong probability, almost amounting to moral certainty, that if the hospital be established it will be an actionable nuisance. . . . The decision depends upon the facts proved in the particular case, with due regard to the opinions of experts so far as they are founded upon facts; but with

[a] The Irish Reports, published under the control of the Incorporated Council of Law Reporting for Ireland. 1904. Vol. I. Chancery Division Page 161, *et seq.*

due regard, also, to the decisions of other Courts pronounced upon similar evidence in other cases."

The Lord Justice went on to say:—

"It seems probable that the dread of small-pox is to a great extent the result of tradition: that scourge of the eighteenth century retains its terrors for those who do not realise that it has been deprived of most of its terrors. Vaccination is not only a preventive—it also modifies the disease. The evidence even of Dr. Thresh is that vaccination and re-vaccination at proper intervals confer 'practical immunity.' In applying the maxim *sic utere tuo ut alienum non lædas*, the duty of reasonable precaution for one's own protection is not to be ignored. An Isolation Hospital reduces the risk for every inhabitant of the district—it is, in fact, a necessity; and though the individual must be protected, the public advantage should not be forbidden unless the danger and injury to the individual are clearly proved."

In conclusion, the Lord Justice held that the action must be dismissed on the ground that no real danger had been proved. The other members of the Court concurred. They were Lord Justice Walker (now Lord Chancellor of Ireland) and Lord Justice Holmes.

Notwithstanding Dr. Hope's opinion and the judgments I have quoted, there can be no doubt that the doctrine of the aërial convection of small-pox is widely accepted by the medical profession both at home and abroad. Writing in "Nothnagel's Encyclopædia of Practical Medicine," in 1902, Dr. H. Immermann, of Basle, observes:—

"Of the greatest importance for the epidemic spread of the disease is the fact that the contagion existing in the pock-contents is volatile (*contagium volatile*). This signifies that the specific agent possesses the power, by means of effluvia from the patient, of mingling mechanically

with the surrounding atmosphere and of infecting the air to a distance. This volatility is not only a property of the contagium of small-pox but it is so to a very high degree, and on this peculiarity rests the great danger of infection. This danger is naturally greater where many patients are crowded together and where the eruption is extensive. For a susceptible person, the danger is greatest if he comes often to, or stays long in, a small-pox locality or in the neighbourhood of a small-pox patient, while with increasing distance the 'chance of acquisition' rapidly lessens. But the vitality of the volatile variola poison is so great that pathogenic transmission of it for great distances (100 metres and over) through the open air is by no means unheard of."

This is not the place to discuss at length the question of the aërial convection of small-pox. Suffice it to say that a doctrine which was held by such a master as the late Sir Richard Thorne Thorne, and which has received support from the investigations of Mr. W. H. Power, the very able Medical Officer of the English Local Government Board, Dr. G. S. Buchanan, one of the Medical Inspectors of the same Board, Dr. John Thresh, Medical Officer of the Essex County Council, and many others, is deserving of full consideration.

During the last epidemic of small-pox in London, which began in August, 1901, and continued through a large part of 1902, practically all the cases of the disease were brought by the River Thames Ambulance Service to three hospital ships of the Metropolitan Asylums Board, which were moored off the South Bank of the Thames in Long Reach, opposite the districts of Orsett and Grays, in South Essex. Between September, 1901, and June, 1902, these districts sustained a severe outbreak of small-pox. Throughout the period of the epidemic a large number (usually

between 100 and 300) of acute cases of small-pox were under treatment on board the hospital ships. Dr. Thresh has given an account of the behaviour of small-pox in past years in the Orsett Union, and has shown that the disease has been introduced into the district at Purfleet on many occasions when the hospital ships contained notable numbers of cases of London small-pox.

Here is Mr. Power's opinion of the evidence furnished by the Orsett outbreak:—

"The operation of these ships in this way—certainly in 1901-02, if not always on previous occasions—can only be thought of as a matter of aërial transmission of infection. There was no traffic or communication whatever between the hospital ships and the northern shore. The account of this outbreak, when considered along with the data accumulated with regard to various small-pox hospitals in different parts of the country, affords an interesting illustration of the conditions which I have shown, in reports to the Board in 1886, to have occurred around London hospitals of the Metropolitan Asylums Board in former years, when these hospitals were used for the isolation of acute small-pox cases."

An important leading article on the spread of small-pox from hospitals appeared in the *Lancet* for January 12, 1906. The writer considers that the facts regarding the outbreaks of small-pox in the Orsett Union in Essex in 1901-02, and in Felling in 1903-04, are hardly capable of any other explanation than that afforded by the doctrine of aërial convection. The story of the latter outbreak, as told by Dr. George S. Buchanan, of the Local Government Board, is very striking. The urban district of Felling adjoins Gateshead, and the Gateshead Hospital is situated near the boundary line. Traffic to and from the hospital is all from Gateshead. Felling cases go to a hospital of

their own, and no convenient route from the affected part of Felling passes the Gateshead Hospital, which is situated on out-of-the-way rising ground Yet the Felling small-pox epidemic mainly attacked not its most populous part near the Tyne, but the higher and comparatively open country to the south, particularly a village less than half a mile from the Gateshead Hospital—a village lying in the path of light south and south-west winds blowing across the hospital towards the village. The small-pox incidence on dwellings within half a mile of the hospital was about three and a half times that on the dwellings farther away, and no one of the wards in any part of Gateshead or Felling had so high a rate of small-pox as the half-mile area, the nearest approach to that rate being experienced by a Gateshead ward, which had many dwellings within a mile of the hospital.

In answer to a query addressed by me to him for the purpose of this communication, Dr. John Marshall Day, the Registrar and Resident Medical Officer of the Fever Hospital and House of Recovery, Cork Street, Dublin, writes as follows, under date February 2, 1906. It will be seen from his letter that Dr. Day is of opinion that the facts observed in Dublin in recent outbreaks of small-pox point to the dissemination of the disease by "contacts" and fomites (or infection carriers) rather than through the atmosphere (aërial convection):—

"The reason we ceased to admit cases of small-pox was that the Irish Local Government Board, impressed by the aërial convection theory, came to the conclusion that Cork Street, being in the city, was not a suitable place for the treatment of that disease, and urged this view on the Corporation. The latter body finally settled on the Pigeon House site as the best and most suitable they could obtain. I believe the Local Government Board based their opinion

on the admirable report of the late Sir Richard Thorne-Thorne.

"In 1887-8 we treated and stamped out an outbreak of small-pox, which, fortunately, was limited to twenty persons. In 1892 there were two cases. In 1893 one case. In 1894-95 there were 796 cases. In 1895-96 there were 216 cases. In 1896-97 two outbreaks occurred, embracing three or four cases respectively. Since 1897 we have had isolated cases of small-pox in the hospital and at Beneavin, the Convalescent Home of the Hospital at Glasnevin, Co. Dublin, but no considerable outbreak.

"In the years 1894-96, although the numbers were so high, we did not find any difficulty in preventing the spread of the disease to the other patients, although in many cases we did not re-vaccinate them—a practice which was put in force only during the latter part of the epidemic.

"Some of the non-variola cases developed the disease after admission, but in all such cases we were able to trace the source of infection to outside causes—for example, coming from infected houses, contact, &c. In one case—that of a scarlatina convalescent—there was direct contact through disobedience of the patient. This patient was sent back to us a fortnight after leaving with small-pox. During the last epidemic we traced all the cases to direct contact with the infected area or with infected clothes. In the 1887-88 outbreak we also traced all cases to direct contact, although several of the cases were admitted from localities that were free from infection.

"There is no doubt that the last epidemic was stopped by the vigorous action of the sanitary authorities, who isolated the sick, segregated the 'contacts,' re-vaccinated wholesale, and paid frequent house-to-house visits in the infected areas.

"We shall not in future admit any case of small-pox,

as the Isolation Hospital at the Pigeon House will admit all cases occurring in the city as well as in the districts of the North and South Dublin Rural Councils."

The English and Irish Local Government Boards have, not without reason, practically accepted the doctrine of the aërial convection of small-pox as proved. For some years the English Board, at all events, have framed their regulations for the hospital treatment of the disease accordingly. The following is an extract from the memorandum of the Local Government Board for England "On the Provision of Isolation Hospital Accommodation by Local Authorities (1902)":—

"*Hospitals for Small-pox.*—In view of the frequently-demonstrated liability of small-pox hospitals to disseminate that disease to neighbouring communities, and in order to lessen the risk of such occurrence the Board require the following conditions to be complied with in the case of small-pox hospitals provided by means of loans sanctioned by them:—1. The site must not have within a quarter of a mile of it either a hospital, whether for infectious diseases or not, or a workhouse, asylum, or any similar establishment, or a population of as many as 200 persons. 2. The site must not have within half a mile of it a population of as many as 600 persons, whether in one or more institutions or in dwellinghouses. 3. Even where the above conditions are fulfilled, a hospital must not be used at one and the same time for the reception of cases of small-pox and of any other class of disease."

These regulations—everyone of which, by the way, is violated in the case of the Clonskeagh Isolation Hospital, above alluded to—have caused great difficulty in providing hospital accommodation for small-pox in England. This difficulty does not exist in Germany. Hear Mr. W. H. Power on this point:—

"Disappearance from Germany of epidemic small-pox is a fact altogether without question. For more than a generation—ever since Germany adopted compulsory vaccination and re-vaccination—sanitary administration in that country has been practically untroubled by this disease. This freedom of Germany from small-pox has, it is asserted by objectors to vaccination, been due less to universality of acceptance of primary, succeeded by secondary, vaccination than to prompt systematic and vigorous isolation of each small-pox case as it arose." [a]

In the circumstances the Right Hon. Walter H. Long, who was at the time (1903) President of the Local Government Board for England, determined, partly in the interests of science, but mainly in reference to administrative and financial considerations, to ascertain through the Medical Department of the Board what in the present is the German method of dealing with small-pox outbreaks. Accordingly, Dr. R. Bruce Low, one of the Board's Assistant Medical Officers, having been furnished by the Foreign Office with necessary credentials to the German Government, visited Germany in the autumn of 1903 and made inquiry in certain representative towns of the chief States of that country as to current methods of suppressing small-pox.

In his report on the arrangements in Germany for the isolation of small-pox patients, Dr. Low gives, for purposes of comparison, the number of recorded deaths from small-pox in that country and in England and Wales during the twelve years 1891 to 1902 inclusive. In Germany, with a population of 56,367,178 in 1900, 607 deaths from small-pox were recorded in the twelve years. In England and Wales, with a population of 32,526,075 in

[a] Report of the Medical Officer for 1903-04. Thirty-third Annual Report of the Local Government Board. Page xxxv.

1901, the deaths from small-pox in the same twelve years numbered 6,761. Had the mortality from small-pox been as low in England and Wales as it was in Germany, only 352 deaths would have happened in the twelve years—in other words, 20 people died in England and Wales of an absolutely preventable disease for every one victim of the same disease in the German Empire.

As a result of his investigations, Dr. Low ascertained that the machinery, preventive and other, for dealing with small-pox in Germany comprises:—

(1.) Compulsory vaccination of all infants before the end of the calendar year next succeeding that of their birth; and *compulsory re-vaccination* of all children in their twelfth year; compliance of parents with the above requirements as to vaccination and re-vaccination being enforced by fine or imprisonment.

(2.) Notification of all cases of small-pox.

(3.) Powers to isolate in hospitals cases of small-pox or of suspected small-pox.

(4.) Vaccination or re-vaccination of the "contacts" in small-pox-invaded houses, and, in some towns, isolation of such contracts.

With reference to measures of isolation Mr. W. H. Power informs us that, as Dr. Low ascertained, no specially provided small-pox hospitals exist in Germany, save in rare instances. In fact, owing to the system of vaccination and re-vaccination there in force, the demand made by small-pox upon isolation accommodation is so trivial that in the majority of places one of the pavilions of the "General Diseases Hospital" within the town has sufficed in all ways for dealing with small-pox emergencies.

Now and again, it is true, Dr. Low found a single pavilion nominally allotted for small-pox; but almost invariably such pavilion was, in the absence of small-pox,

used for the other and general purposes of the hospital establishment. Further, it appeared that such small-pox pavilion, even when in use for small-pox, was in most instances allowed to remain, administratively as well as structurally, one with the hospital establishment of which, in ordinary circumstances, is constituted a part. Similarly, it is not deemed needful in Germany, when small-pox is being accommodated in a section of a local hospital, to require re-vaccination of the hospital staff or of the "general" patients in the establishment, reliance against spread of the small-pox being placed on the routine statutory primary vaccination and re-vaccination that these persons have already undergone. Persons, however, who are of necessity brought into near and sustained relations with the small-pox patient, or patients in the hospital, have to submit to a further vaccination.

An excellent illustration of the trifling expense and trouble to which Germany is put in the matter of isolation of small-pox is afforded by Berlin, with a population of near upon two million persons. For this city the sole provision for small-pox is a pavilion, containing twelve beds, at the Royal Charité Hospital, which can accommodate at one and the same time some 1,500 patients suffering from a variety of maladies, medical, surgical, and other.

So far as Dr. Low was able to find out, and he was careful to make special and detailed inquiries on the subject, no serious inconvenience has at any time attended the method of small-pox isolation now adopted by Germany. Furthermore, it appears that all the officers and physicians with whom Dr. Low conferred on the matter were unanimous in attributing the immunity from small-pox enjoyed by the population in the neighbourhood of small-pox pavilions in Germany to the systematic enforcement of statutory vaccination and re-vaccination. But for this

antecedent precaution, all those persons agreed it would be necessary to establish, outside the town limits in each instance, a small-pox hospital, distinct and separate from the local hospital provided for "general" disease.

Some five-and-twenty years after the introduction of vaccination, the increasing occurrence of small-pox and varioloid among vaccinated individuals shook to its foundation the doctrine, held by Jenner and the pioneers of vaccination, that the vaccine disease conferred a life-long immunity against small-pox. Immermann shows that the re-vaccination movement had its beginning in the year 1824, and received decided impetus from the severe epidemics of small-pox which raged throughout the greater part of Europe in the following years up to 1833. To the States of the German Confederation belongs the credit of making re-vaccination compulsory in the army. The Würtemberg Government gave orders in 1829 that all recruits, without exception, must be re-vaccinated. This obligation was enforced by law four years later. Prussia followed only one year afterwards with a similar law (1834); then came Hanover (1837), Baden (1840), Bavaria (1844), and in succession the other smaller States.

Shortly after the terrible Franco-Prussian War broke out in the summer of 1870 small-pox appeared and soon spread over the greater part of Europe as a virulent and persistent pandemic. A notable exception to the wide-spread diffusion of the outbreak was afforded by the troops of the German Army, in which the number of individuals attacked and the mortality of the disease were markedly less than among the remaining population of the Continent. The French Army, on the other hand, suffered frightfully from small-pox, and, in fact, contributed largely to the dissemination of the disesae among the nations of Europe. The absolute mortality from small-

pox in the French Army was nearly fifty times greater than that of the Germany Army, and the ratio of deaths to all the cases was at least twice as great.

A very marked, though less striking, difference was observed in the mortality from small-pox as it effected the army and the civil population of Germany.

On the favourable results of systematic compulsory re-vaccination in the German Army, the medical profession based a demand for a general Vaccination Law to be enforced throughout the newly-constituted German Empire. And so the "Imperial Vaccination Law" of Germany was approved by the Reichstag, April 8, 1874, and took effect April 1, 1875. Since the latter date there has been no great epidemic of variola in Germany, although cases of small-pox have occasionally been observed upon the exposed frontiers of the Empire. As regards re-vaccination, this great Statute requires that every pupil in public or private schools shall be re-vaccinated when twelve years of age if he or she has not had small-pox within the previous five years. If the re-vaccination is unsuccessful, it is to be repeated in the following year.

The law originally allowed the use of human vaccine lymph, lymph from an original case of vaccine disease, and bovine lymph from an artificially-transmitted vaccinia. When serious objection was urged to human lymph and retro-vaccine lymph on the ground of a possible transmission of syphilis, it was enacted in 1885 that the use of pure animal lymph should be gradually adopted. Now that the State Institutions for the production of vaccine lymph are able to supply the necessary quantity of pure bovine lymph the legitimate and regular form of vaccination and re-vaccination in the German Empire to-day is by pure animal virus. Immerman says[a]:—"It might have been supposed

[a] Loc. cit. Page 186.

that European countries generally would either have followed the good example of Germany, or have been stimulated to the production of still better legislation. Nothing of the kind has occurred, however, and at the present time Germany alone enjoys comparative immunity from variola."

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The President did not think that anybody who studied the question from a scientific standpoint could possibly have any doubt as to the efficacy of vaccination in the prevention of small-pox, and further expressed himself as agreeing entirely with the opinions held by Sir John Moore.

Dr. Delahoyde held that it would be very difficult to enforce compulsory vaccination and re-vaccination in these countries, though he thought it would be easier to have such laws carried out in Ireland than in England and Scotland, as the people of Ireland were more inclined to take the advice of medical men on such subjects, and he further said that previous to attempting to obtain legislation we ought to endeavour to educate the public.

Dr. T. P. Kirkpatrick said that it was, in his opinion, a matter of complete indifference how small-pox was disseminated, because if the community was protected by vaccination and re-vaccination the disease could not spread.

Dr. H. U. Byrne spoke as a public vaccinator, and, while completely agreeing with the paper, he instanced the difficulty he had experienced in getting the workingmen to consent to be re-vaccinated, though they were quite willing that their families should be done. This difficulty was caused by their natural objection to be unable to go to work. He further held that there was no real objection on the part of the public in Ireland to vaccination, but went on to express his doubts as to whether the number and depth of the scars of primary vaccination were any guide as to the amount of protection enjoyed by the person.

Sir John Moore then shortly replied, and expressed the opinion that it would not be wise at present to advocate the bringing in of a Bill in favour of compulsory re-vaccination, although no opportunity should be lost of impressing on the public the value of re-vaccination as a preventive of small-pox, and the necessity for it at or about the age of 12 years.

# SECTION OF ANATOMY AND PHYSIOLOGY.

## SUPERNUMERARY CARPAL BONES.

By H. M. JOHNSTON, M.B.;
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[Read in the Section of Anatomy and Physiology, January 26, 1906.]

Few cases of supernumerary carpal bones have been described in English anatomical literature. Indeed, in the *Journal of Anatomy and Physiology*, since the review of Gruber's investigations on the Os Centrale, Vol. XVIII., p. 119, and Sir William Turner's paper, Vol. XVII., p. 244, there has been practically no reference to the subject. This may be due in part to the infrequency of occurrence of these abnormalities, or to their presence being unsuspected until the process of maceration is completed. If a supernumerary bone is then discovered it is difficult or impossible to determine its position or relations.

The late Professor W. Pfitzner, of Strasburg, in recent years (*Zeitschrift für Morphologie*, 1900, p. 77) has published a thorough investigation upon this subject, and in his paper he shows the frequency of occurrence of the different varieties of supernumerary carpal ossicles, and discusses various other congenital abnormalities in this region. The value of his work is greatly enhanced by his having himself dissected and prepared his specimens.

Last winter, while dissecting the dorsal surface of a wrist joint from a male subject, I noticed that an abnormal bone was present. I obtained the other hand of the sub-

ject and carefully dissected the specimens. The other hand was also found abnormal. The specimens which I now exhibit are, I think, of sufficient interest to be recorded.

The lunar bone at its distal radial angle is markedly elongated and prominent, and curves towards the radial side. This prominence consists mainly of a separate bone joined to the lunar by fibrous tissue, but freely movable. Its anterior aspect is coated with cartilage, and articulates with a flattened—almost circular—facet, coated also with cartilage on the dorsal surface of the scaphoid at its ulnar extremity, to which it was united by a ligament forming a sort of capsule, and the synovial cavity thus formed was continuous with that betweeen the scaphoid and lunar.

The ossicle is of an oval shape, its long axis placed transversely to the long axis of the forearm. The posterior surface is convex and free, and its edges are thinner than its centre. Its length from side to side is 1.3 c.m., and its breadth is .9 c.m.

This bone corresponds in position to what Gruber described as the rarer form of os centrale, but Pfitzner does not consider that there are two varieties of the os centrale, and it answers to his description of the epilunar, which is a cartilaginous nodule appearing at an early age, generally becoming fused with the radial distal corner of the lunar, but sometimes remaining as a separate ossicle in that position. The spur which is so frequently found at the radial distal angle of the lunar bone on the dorsal aspect represents this separate ossicle, and the groove on the dorsal surface of the scaphoid at its ulnar extremity represents the position which it occupied. This groove can be detected more or less marked on almost every scaphoid.

The specimen shows, articulating with the radial distal end of the lunar, another ossicle. It also articulates with the head of the os magnum by a lunar facet, a continuation in fact of the concave facet on the lunar for the os magnum. It is joined by a ligament to a little tubercle on the palmar surface of the scaphoid, and embedded in this ligament is a very minute nodule of bone.

The bone itself is .9 c.m. in its longest axis, .5 c.m. from before backwards, and .3 c.m. in thickness; its distal and palmar surfaces are non-articular. It looks as if it were a separation of the radial distal part of the lunar. The surfaces which articulate with the lunar and os magnum are lined by a thin layer of cartilage.

This bone corresponds exactly to what Pfitzner has named the hypolunar, defining its situation to be the palmar aspect of the lunar at its distal radial angle; this, which may exist as a separate nodule of cartilage at an early age, fuses with the lunar later. There is no other abnormality in this carpus.

The left hand, when examined dorsally, presents a most peculiar appearance. The scaphoid is seen to be divided into two completely separate portions—a proximal and a distal—the division being more or less transverse.

The proximal portion, which seems degenerated and incompletely divided into several pieces, is joined by the superior scapho-lunar ligament to the lunar, and includes the ulnar part of the radial articular facet as well as a small part of the articular surface for the os magnum. To the distal portion belong the facets for the trapezium and trapezoid, which are normal, the whole of the posterior surface (which is very prominent, and of greater breadth than usual) and the greater part of the concavity for the head of the os magnum. Attached to the lunar by fibrous tissue, and situated between the scaphoid, lunar, pyra-

midal, and os magnum, a separate and distinct bone is found. It is larger than that found on the dorsum of Specimen I., but corresponds in position to it. It was united by ligament to both parts of the scaphoid from the distal portion, of which it has been separated. Its dorsal non-articular surface continues the prominent dorsal surface of the scaphoid ulnarwards, and almost meets the posterior surface of the pyramidal. Its anterior surface is concave, and articulates with the head of the os magnum, and it is connected by ligament to the radial distal part of the lunar.

The bone is of somewhat quadrilateral shape, its longest diameter 1.5 c.m. placed transversely, it is 1.1 c.m. from above downwards at its widest part, and of about .4 to .5 c.m. in thickness.

At the junction of the third metacarpal and the os magnum is seen a marked projection, formed not only by the styloid process but by a prominence at the radial distal corner of the os magnum. The articulation between the two bones here is linear, and so intimately united were they (by ligament) that it seemed at first as if they were completely fused together. This prominence projects posteriorly 7 mm. One other instance of this condition has been recorded in the *Journal of Anatomy and Physiology*, Vol. XXVIII., in the Fourth Annual Report of the Committee of Investigation of the Anatomical Society for the year 1892-1893.

On the palmar surface, except the fissure caused by the division of the scaphoid, nothing abnormal is to be noticed. The line of division starts from the level of the styloid process of the radius, and runs ulnarwards and slightly distally.

It might be said that these abnormalities were the result of rheumatic arthritis, considering that the age of the sub-

ject was stated to be seventy years, but the symmetry of the epilunar and the correctness of its position are against this. Further, with the exception of a curious ankylosis of the bodies of the lower cervical vertebræ, there were few indications of rheumatism in other parts.

These ossicles are true bones, as they contain cancellous tissue. This was beautifully shown in some stereoscopic X-ray photographs, kindly taken for me by Dr. W. S. Haughton. The division of the scaphoid into two parts may be accounted for in two ways. It is either the result of injury—*e.g.*, a fall on the hand—and in support of this view a fracture of the coracoid process was found on that side, the piece of bone being completely separate, and having the coraco-acromial ligament and part of the pectoralis minor tendon inserted into it, and almost all the short head of the biceps and coraco-brachialis muscles arising from it; also, the surfaces of the scaphoid opposed to one another are not coated with cartilage.

The other view, that it is a congenital division of the scaphoid is possible, and it resembles Pfitzner's description of that condition. Whatever view is taken the specimen from the condition of the scaphoid alone is interesting.

# SOME SPECIMENS SHOWING INDICATIONS OF THE PRESENCE OF AN OCCIPITAL VERTEBRA.

By A. FRANCIS DIXON, D.Sc.;
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[Communicated to the Section of Anatomy and Physiology, January 26, 1906.]

ATTENTION was drawn to a recent communication of Kollmann's on the variations of the occipital bone and on the occurrence of portions of an occipital vertebra. The significance of the various markings to be observed around the foramen magnum in the seven specimens exhibited was mentioned. It was suggested that the body of the occipital vertebra was perhaps to be sought for in the little ossicle normally developed at the apex of the odontoid process of the axis vertebra. The relatively early appearance of this ossicle, and its ossification, sometimes, at all events from two centres, seems to favour this idea, and to distinguish the little bone from the vertebral epiphyseal plates with which it is usually included. Further, the fact that the anterior end of the notochord at first lies dorsal to, and is not included in, the cartilaginous basi-occipital perhaps justifies one in not seeking for the body of the occipital vertebra in the occipital bone.

# THE RELATIONS OF THE PNEUMOGASTRIC AND OTHER NERVE FIBRES TO THE PERSISTENT ARTERIAL ARCHES.[a]

By ALEC FRASER, M.B., F.R.C.S.;
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[Communicated to the Section of Anatomy and Physiology, January 26, 1906.]

THE remarks which I have to make are based mainly upon what can be easily dissected on the left side of the human subject. The superior laryngeal represents the nerve which passes to the larynx between the internal carotid and the early dorsal aorta. The latter disappears between the carotid and the aortic or fourth arterial arch, and so lets the nerve free. Should the early connection persist as a cord, the nerve would be found at the junction formed between it and the internal carotid artery, just as the recurrent or inferior laryngeal nerve is always found looping round the junction of the ligamentum arteriosum with the dorsal aorta. Between the internal carotid and the ligamentum arteriosum—which latter represents the sixth arterial arch—there are two arterial arches, one of which, the aortic, has always a complete loop of nerve fibres around it, formed mainly by the upper cardiac branches of the vagus, that of the left side passing in front of the arch to join its neighbour of the right side behind the arch. The primitive fifth arterial arch disappears; but there is clear evidence of a second loop of nerve fibres round the aortic arch coming chiefly from the last cervical and first dorsal ganglia of the sympathetic, those from the left side

[a] This communication was illustrated by drawings on the blackboard.

being mainly in front and joining those from the right side behind. As I am only dealing with the persistent arches, I may leave this loop out of consideration for the present. In addition to those enumerated—viz., superior laryngeal round the internal carotid arch, the cardiac branch loop round the aortic arch, the evidence of a second loop round the aorta, which may represent that of the lost fifth arterial arch, the recurrent laryngeal round the sixth arterial arch, I invariably find another loop formed from the vagus, passing round the front aspect of the functional pulmonary artery (on the left side) to join the nerves behind. This loop is quite clear of the branches running to the lung root, and points suggestively to the Gill cleft origin of the lung.

# THE DEVELOPMENT OF THE FAT CELL.

By D. J. COFFEY, M.B.;
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[Read in the Section of Anatomy and Physiology, April 27, 1906.]

The first appearance of fat in the connective elements of the body occurs as early as the fourteenth week in the human embryo, and in other mammals at a corresponding period of their intra-uterine life. At that time, as well as in the later stages of embryonic growth, the well-known phases of fat formation may be clearly recognised in some of the situations in which membranes of connective tissue are being laid down. In ordinary embryological studies the presence and the character of the fat cells are often overlooked, or not insisted on, because of the greater importance attached to the study of the more special tissues, or from the relative insignificance of fat as a contributory element in organic development. On this account it is not easy to prepare a series of sections which illustrate in a comprehensive form or in a manner adequate for purposes of class demonstration, the sequence of development of the fat cells and their relation to the antecedent mesoblastic elements, if investigation be limited to the study of the embryo. Material of a very suitable description is, however, available in newly born animals, and, with a little care in the selection, it is possible to obtain a great variety of sections which furnish all the stages of development in the midst of fully-formed muscular, cartilaginous, and other specific elements. The usefulness of such material is apparent in that it enables the student to recognise at a glance all the essential characteristics of undifferentiated connective tissue cells, or normal fat formation.

and of finished adipose tissue. It, moreover, provides a control preparation for the study of the pathological formation of fat, which, being easily accessible, might be profitably employed in the ordinary course of class instruction.

The preparations were taken from a three-days-old kitten. I selected portions of the œsophagus and trachea, of the thymus and neighbouring connective tissue, of the spleen and adjacent portion of the stomach, as likely to provide pieces of adjoining connective tissue suitable for the purpose. The sections show the normal structure of these organs with outlying cells presenting a series of characteristic changes. In one slide, of the trachea and œsophagus, close to some transversely-cut striped muscular elements, are to be seen polygonal cells almost identical with normal liver cells. They show a central round nucleus, a granular protoplasm, and are in size of an average diameter of 15 micro-millimetres. Stained with hæmatoxylin and eosin they take a tint similar to that of the neighbouring striped muscular elements, and on superficial examination would be indistinguishable from them but for the position and shape of the nucleus. A second section from the surface of the thymus is identical. A third from the gastro-splenic omentum shows similar cells, suggestive of a supernumerary liver lobule. In the latter a few of the cells present the first appearance of fat granules. The other slides from the same material show clearly all the stages of fat formation. The fat drops, few in number, and small at first, coalesce; the nucleus is pushed to the margin; the cell with little increase in size is being transformed into the typical fat cells.

The lobular grouping is apparent when the cells are numerous, but the process can be seen affecting a very few cells in the connective tissue around the œsophagus.

# DISSECTIONS OF THE DURA MATER FROM BELOW.

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[Communicated to the Section of Anatomy and Physiology, April 27, 1906.]

The skull had been sawn across in the usual position adopted in the removal of the brain, but in place of taking off the calvaria the base of the skull was cut away. Before doing this the periosteum of the orbit was detached from the bone in order to preserve its continuity with the dura mater at the sphenoidal fissure and the optic foramen. The structures passing through the foramina at the base of the skull were defined along with their sheaths of dura mater. The skull was then gradually cut away after being detached from the dura mater. In most situations this is easily done, but special care is necessary to preserve the dural prolongation into the internal auditory meatus and to avoid tearing of the dura mater over the petrous part of the temporal bone. Some trouble may also be experienced in removing the dorsum sellæ and the anterior clinoid processes from the deep recesses in which they lie. Specimens prepared in this way are useful for the demonstration of the relations of the dura mater to the nerves and blood vessels, and afford instructive views of the topography of these structures at the base of the skull, especially of the Gasserian ganglion and the divisions of the fifth nerve.

In the ordinary method of removing the brain the arachnoid at its base is torn across in various places, and

the cranial nerves divided, so that the subarachnoid cisternæ and the course of the cranial nerves through the subarachnoid spaces cannot be properly studied. On the other hand, in specimens with the dura mater exposed from below, the subsequent dissection of the arachnoid and of the contents of the subarachnoid space is greatly facilitated.

# THIONIN AS A BULK STAIN FOR THE CENTRAL NERVOUS SYSTEM.

By T. H. MILROY, M.D., B.Sc., F.R.C.S. Ed.;
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[Read, by permission, in the Section of Anatomy and Physiology, April 27, 1906.]

There are many disadvantages to be derived from the employment of a bulk stain in preference to the usual method of staining after fixation of the sections to the slide. This holds especially, perhaps, for the central nervous system, where large tracts have to be explored and where the staining of a very large number of serial sections entails a vast amount of labour.

All who employ Hirst's method know how laborious the task is of preparing sections from a large number of different parts of the central nervous system. My brother, Dr. J. A. Milroy, has been in the habit of staining in bulk with methylene toluindin blue, and recently he and I have employed thionin in their place.

The method employed is the following:—Small pieces of the central nervous system (cord, medulla, pons, &c.) about 1 c.m. in thickness are taken from the tissue, which has been previously fixed in 4 per cent. formalin. These are washed for some hours in running water, carried through the series of alcohols up to methylated spirit, and then washed in running water over-night. The pieces of tissue are then placed in a vessel containing a saturated watery solution of thionin, and kept in this at a temperature slightly above room temperature (top of imbedding oven) for about a week. As a rule the permeation is sufficient by

this time, but it is advisable to cut into the tissue and see if this be so. When permeation is complete, the tissue is placed in running water over-night, then carried through the alcohols to absolute alcohol, xylol, paraffin. The absolute alcohol ought to be changed at least thrice, the tissue being left in it not less than forty-eight hours. After imbedding in paraffin and cutting, the sections are floated out on warm water, placed in series on slides, and dried in the incubator. All that is then necessary is to remove the paraffin with xylol and imbed in Canada balsam.

The appearances presented by the sections are similar to those shown by a specimen prepared by the usual Hirst's method, with the addition of a red contrast stain, as thionin acts metachromatically.

The spindles in the nerve cells are well differentiated, while the fibrous elements are stained pink. This method may be of some service to those who have to give out to classes of students sections of central nervous system when a differentiation of the nerve spindles is desired. Also, it may prove useful to those who have to preserve and examine a large number of blocks of spinal cord, &c., when the various nuclei are being studied for changes in their nerve cells.

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